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THE AMERICAN

# GAS LIGHT JOURNAL

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## THE PITTSBURGH MEETING.

The Tenth Annual Meeting of the American Gas Light Association is to be held at Pittsburgh, Pennsylvania, on the 18th of October, and the following days, and it is expected that it will prove to be one of the most interesting meetings ever held by the Association. The local committee to whom is entrusted the duty of making the local arrangements for the meeting is composed of Dr. D. Hostetter, President of the Pittsburgh Gas Light Company; John H. McElroy, Engineer of the same company; Robert Young, Engineer of the Allegheny Gas Company; W. H. Denniston, Secretary and Engineer of the East End Gas Company; and Wm. Gardner, of the Firm of Gardner Bros., and there is no doubt that the programme for the different days will be most complete and interesting. Situated as Pittsburgh is, at the very heart of the gas coal region, there will be offered an opportunity to acquire much valuable information regarding the material which is the basis of the coal gas manufacturing interest. The daily duties of many gas managers are of such an exacting nature that but few are afforded the time and the opportunity of visiting the coal fields, and making themselves familiar with the methods employed in mining, preparing and transporting coal.

Nothing could be more delightful than a visit to the coal fields in the month of October, and some excursions of this kind will doubtless be arranged by the Committee for the benefit of those members who may desire to avail themselves of this opportunity.

Aside from the coal fields there are many other matters that the gas maker could profitably investigate in the city of furnaces. The attention that the manufacturers of iron have paid in recent years to the methods of heating is a matter of record; and although the uses to which the heats are applied differ from those in the retort house, yet there is no doubt a common principle involved, and it may be that careful comparisons of methods might result in much benefit to our profession.

Aside from the iron and steel interests there is another very large industry, larger than many have any idea of, viz., the manufacture of glass. This too is a question of the proper employment and regulation of heat. So that on all sides there are industries of a kindred, though of widely differing, nature.

As to the business meetings we deem it prudent to utter one word of caution. Knowing the hospitality, liberality and energy of the men composing the local committee, it will undoubtedly be found that their programme for excursions, amusements and entertainments, where there is so much that really ought to be seen, will have a natural tendency to encroach somewhat upon the time of the business meetings. It is to be hoped that this will be carefully guarded against, and that the sessions of the Association will be characterized by full attendance, careful attention to business, and a full and free discussions of the papers and subjects presented for its consideration.

The circular addressed to the members by the Secretary will be found below. The list of subjects proposed for the members to write papers upon is certainly one of wide range, and ought to be ample enough to secure a large number of most valuable papers; and it is most sincerely to be hoped that every member will be prepared to contribute some fact to the stock of information which these meetings accumulate. The condition of the gas business has been generally satisfactory during the past year, but the time is close at hand when the closer economies of the business, both in the manufacturing and selling departments, will demand greater attention. The handling of materials is a subject that has been too long neglected; and we trust that the meeting at Pittsburgh will enable the members to see that the sooner the shovel is abolished from the retort house the better it will be for all. Machinery must take the place of physical manual force, elevators, the force of gravitation, and steam should do the work, and brains should do the direction and supervision.

There is one item that is not especially mentioned in the list of subjects issued by the Secretary that we should like to see more fully discussed, and that is, the best methods of keeping the accounts and making collections in the selling department of the gas company management. It is true that

this is no part of the manufacture of gas; but, on the other hand, how many engineers are there who are heavily handicapped in their efforts to give the people cheap gas by the expenses that are incurred after the gas passes the holder?

Has the reduction in the cost of the distribution kept pace with the reduction in the cost of manufacture?

There may be some members of the Association who are more familiar with the details of the financial than with the technical part of the business; and while such members might, naturally, feel a shrinking from taking part in the technical discussions, preferring to listen rather than to be heard, still they could render most valuable service to the business at large by submitting papers upon their own specialties, which would be listened to with the greatest interest, and, perhaps, suggestions thrown out by practical men, who were not specially versed in the matter, might result in some decided economy in the department of accounts which would do something towards the reduction in the selling price of gas. It is to be hoped that some such paper may be presented and discussed.

We give below the Secretary's circular in full, and would express the earnest wish that every member will feel bound to comply with the Secretary's reasonable requests, and that the Pittsburgh meeting may prove the best yet held, and that it may make a record that shall show that the American Gas Light Association is second to none at home or abroad.

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OFFICE AMERICAN GAS LIGHT ASSOCIATION,
142 CHAMBERS STREET, NEW YORK.

Dear Sir: In calling your attention thus early to the coming Tenth Annual Meeting, to be held in Pittsburg, Pa., on Wednesday, October 18th, and succeeding days, it is in the hope that you will be thereby the better enabled to assist by contributing a paper upon some topic of general interest.

I send herewith a list that may aid you in making a choice of a subject; but this is not intended to limit your selection in the least. Matters that have received your special attention, or occurrences in your gas making experience can be used as the basis of most instructive papers.

In case it is possible for you to lend your assistance by presenting a paper on some subject, you will confer a favor by sending early notice of the fact and stating the subject which you propose to present.

As a guide in your calculations or comparisons, a copy of the Standard of Weights and Measures adopted by the Association is enclosed.

Your co-operation is earnestly invited in the effort to make the Tenth Annual Meeting in every sense worthy of the Association.

Respectfully yours,
WM. HENRY WHITE,
*Secretary.*

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LIST OF SUBJECTS.

Observations on Foreign Gas Works and Methods.
Construction of New Works and Extension of Old.
Economy of Labor and Machinery in Gas Manufacturing.
Regenerative System of Furnaces for Heating Retorts.
Comparative Values of Different Coals.
Relative Financial Advantages of Excessive or Average Yields per pound of Coal.
Improvements in Ordinary Furnaces for Retort Benches.
New Retort Settings and their Economy.
Mechanical Drawing and Charging of Retorts.
Prevention or Removal of Carbon Deposits in Retorts.
Stopped Ascension and other Pipes: their Cause, Remedy and Prevention.
Methods for Dispensing with the Dip-seal.
Cheapest and best forms of Scrubbers or Condensers.
Relative Advantage and Comparative Cost of Purifying Gas with Oxide and with Lime.
Best Means of rendering Spent Lime Valuable as a Residual.
The Use of Ammoniacal Liquor as a Purifying Agent.
Methods of Determining the Value of Ammoniacal Liquor.
The Cheapest and best Form of Apparatus for Manufacturing Salts of Ammonia.
The Construction of Gasholder Tanks.
Relative Advantages of Trussed and non-Trussed Gasholders.
The best Methods of Governing the Gas Pressure, with a View to securing a Minimum of Leakage.
Laying Street Mains and Services.
Means of Removing Naphthaline from Mains and Services.
Statistical Information upon the Life and Accuracy of Consumer's Meters.
Supplying Gas to Public Lamps.
Self-Lighting and Extinguishing Apparatus.
Improved Burners, and their Value for Illuminating Open Spaces or Buildings.
Effects of the Competition of Electric Lighting.
Use of Gas for Heating, Cooking and as a Motive Power.
Best Means of Extending the Use of Gas, and how its Consumption may be Increased.
Effects of Condensation and Purification on Illuminating Power.
Best Methods of Handling Coke, and Disposing of same.
Treatment of Tar and Ammonia as Valuable Residuals.
Standards for the Estimation of the Illuminating Power of Gas.
Manufacture of Gas from substances other than Coal.
Apparatus for Compressing Gas, and the Uses of Gas thus Treated.
Best Methods of Receiving, Handling, and Storing Coal, to Prevent "Shortage" in Weight.

STANDARD WEIGHTS AND MEASURES ADOPTED BY THE ASSOCIATION.

1.—All statements of gas production to be made in cubic feet per pound of coal, specifying the kind and quantity of enriching material used—if it be cannel, in percentage of total weight; if naphtha, in gallons per 1,000 cubic feet of total gas production.

2.—The U. S. standard bushel of 2,150.42 cubic inches, for the measurement of lime, and the standard heaped bushel of 2,747.7 cubic inches, for the measurement of coke. Statements of lime used to specify whether slaked or unslaked.

3.—The U. S. standard gallon of 231 cubic inches, for the measurement of tar, naphtha, oil, and ammoniacal liquors.

4.—The U. S. standard ton of 2,240 lbs. for the measurement of coal.

5.—All statements of illuminating power to be accompanied by a description of the burner and photometer used in testing.

Sugg's London "D" Argand burner is recommended as a standard test burner for coal gas.

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## The Petroleum Outlook.

The situation since our last report has undergone considerable change in the producing fields in the direction indicated by us. While the statistics of the month of April herein presented by us do not show up any material change, the "opening up" on May 18th of the Mystery well, on lot No. 646, Cherry Grove township, Warren county, referred to in our last issue, has altogether fulfilled the highest hopes of its owners. It can in all probability be set down as a 600 barrel well at the start. This well opens at a new and almost untried field, and its importance to the trade is very great. Within a radius of 1½ miles of it, two other wells have hitherto been drilled to the full depth, and have proven failures. The color of the oil is not a green like the Butler or Oil Creek oils, as had been stated; but has a color between the Sheffield and the Clarendon oils, which are regarded as amber oils. These facts, together with the fact that the sand is white pebble, somewhat like the Butler county sand, indicate a less diffused and a more uncertain territory than those of Bradford and Richburg.

In the Bradford field the production continues to decline. In the Richburg field there is also a slight decline. Both these fields promise a large decline in the near future, as the surplus energy will doubtless be drawn from them to the new Warren field. The area of the Richburg field has been enlarged a short distance towards the southwest, but not enough to be regarded as threatening enlarged production. Our tables this month show a daily production which is nearly the same as that of last month. We have added to stock 724,656 bbls.

Our advices from Europe are considerably more encouraging than they were last month. The visible stocks at the five principal ports are not comparatively so great as they were, and the demand for export is consequently gradually increasing. The market prices for refined export are ruling considerably better than for several months past.

The market prices of crude in the region, are now lower than they have been for several years. And the effect of this must be to decrease operation in the field, especially in a declining field, such as Bradford. The present prices are not remunerative for the large mass of smaller producers, and must consequently lessen the activity. Whether the activity in the new field will overcome this remains as yet to be seen.

Altogether we are not inclined to look for much lower prices for crude, nor do we believe that we will soon have any material permanent advance. —*Stowell's Petroleum Reporter.*

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A NEW GAS LIGHT COMPANY.—The Equitable Gas Light Company of N. Y. city was lately organized by the election of Wm. Rockfeller, pres., J. R. Keene, vice-pres., and E. N. Dickerson, Jr., sec. and treas. It is the intention of this company to supply hydrogen gas, manufactured under the patents of the late Tessie du Motay. Capital stock, $2,000,000.

[Official Report.—Continued from page 251.]

## Fifth Annual Meeting of the Western Gas Association.

Held at the Grand Pacific Hotel, Chicago, Ills., May 10, 11 and 12.

### GAS AS A FUEL FOR DOMESTIC, MECHANICAL, AND OTHER PURPOSES.

The Convention then took up the regular order of discussion, the first topic being "Gas as a Fuel for Domestic, Mechanical, and other Purposes."

Mr. Butterworth—I would state that we have sold in Rockford about 75 gas stoves. We have not as yet introduced any gas engines, because, in my judgment, they cost too much money. I think that my sales for gas alone, aside from lighting purposes, have been five per cent. of the entire amount.

Mr. King—I would like to ask for the experience of some of the parties present in regard to the best plan for successfully introducing gas stoves into general use. By the record of the New Englaand Association I see that there are various methods suggested. I have also noticed that our worthy President has been giving away stoves. We have successfully introduced a large number of stoves in Jacksonville, but they are all of the smaller class. We propose this year to make an effort to introduce the larger sizes and bring them into more general use. As to the best method of doing that, we are not as yet satisfied. Heretofore we have sold a number of stoves by inducing our consumers to give them a trial for one month free, and if at the end of that time they were not satisfied, we were to remove the stove at our expense. I have not as yet had occasion to take back a stove.

Mr. Howard—In regard to the introduction of gas stoves, it is a difficult matter to decide exactly upon the best plan, because that which might suit one place would not suit another. In England and Ireland a very good method has been adopted, which has met with phenomenal success. That is, they have what they call an "exhibition" of all articles connected with the use of gas. The different makers travel from one city to another, show their goods, advertise them thoroughly, and as a matter of course many of the articles are sold.

Mr. Ramsdell—To my mind, the best way to introduce gas stoves is the same method we adopt to advance any other business interest, and that is simply to advertise them in one way or another. The "exhibition" spoken of was doubtless a good plan, but in this country we have no such displays; and in small works, such as those at Vincennes, it would be a matter involving more expense than we could afford. Last year I adopted a plan which I think promises well. I prepared circulars, which I addressed to every gas consumer on the line of our mains. I dropped them in the post office; but I afterward awakened to the fact that in nine cases out of ten the head of the household received them, and that was the last seen of the circulars in question. Not at all discouraged, I made another effort. I had some more printed; but these I addressed to the ladies of the household, and from them I expect much better results.

Mr. Butterworth—I wish to tell you how we get rid of gas stoves in Rockford. We are differently situated from most of you. I might almost go so far as to say that we have even had to build houses for people to live in in order to induce them to use gas. The best plan I have yet discovered is this: The cost of a stove I multiply by three, and then tell my customer that if he will contract for gas to that amount I will furnish him with a stove free of expense. I have printed circulars to this effect, which I have distributed.

Mr. Dunbar—Mr. Burns can probably give us some information on this subject. From a very pleasant experience which I enjoyed at the palatial hotel in Pullman, I know that all the cooking at that establishment is done by gas. Perhaps Mr. Burns will kindly explain to us the method there in use.

Mr. Burns—I am happy to state that there is an excursion to Pullman on the programme for to-morrow or the day thereafter, and I simply invite you to call and see for yourselves. In regard to the cost of using gas for cooking purposes on a large scale, I would state that the former landlord of the hotel in question has assured me, as the result of his experiments, that in his judgment gas is the most economical fuel that can possibly be employed. I have about 35 or 40 stoves in use outside of the hotel, and they are giving excellent satisfaction. We sell gas for $1.75 per thousand to those who use it as a fuel, our regular price for lighting purposes alone being $2.25. The gas is all passed through the same meter. When a consumer buys a stove and uses it he is charged at the rate of $1.75 per thousand.

Mr. Littleton—Some time ago we purchased a number of stoves and started out with the view of renting them; but we have hardly got far enough along to enable me to tell you with what success we may eventually meet. Our rate of rental for a stove which costs, say, $15 or $20 has been fixed at $1 per month. As soon as the consumer has paid the entire amount in monthly installments the stove becomes his property. As I before stated, our experience has been too brief to enable me to decide as to our ultimate success.

The President suggested that Mr. Ramsdell open the discussion in reference to gas engines.

Mr. Ramsdell—I believe I have nothing new to say upon that subject. At the time I read my paper here in Chicago I made a statement, which I had compiled with great care, of my knowledge upon that subject up to that time. I will simply say that I have found nothing since which would tend to contradict the statements made in that paper. I have carefully observed the course of quite a number of gas engines that I have had something to do with, and I have not found anything but what would tend to substantiate the figures I presented at that time. As regards their economy, I think there is no doubt whatever that they are, by a considerable percentage, the cheapest motive power now in use. I feel very confident that the future of gas engines is destined to be a brilliant one. The manufacturers of the Otto engines have materially enlarged their capacity, but even now are far behind in filling their orders.

Mr. Littleton—It seems to me that the great drawback to the introduction of gas engines has been the excessively high price which has been asked for them. It costs about $700 to purchase a 4-horse power Otto gas engine delivered anywhere in the West. We have introduced two at Quincy, and the prospects are that we will sell very few more unless we can get reduced prices, which is now seemingly impossible. I have heard that there are parties making arrangements for manufacturing a different engine from any now in use in this country, at a greatly reduced price, and that there is a gentleman present who is interested in the enterprise. I would like to hear from him.

Mr. Burns—Mr. Stein is the gentleman referred to. I believe he will be pleased to give us some information on this subject.

Mr. Stein—I am not at present prepared to say much on the subject of gas engines. Mr. W. W. Goodwin, of Philadelphia, will be with us tomorrow morning, and be better prepared than I to tell you all about it. I will say, however, that we have become interested in this subject, and have closed negotiations for the manufacture of an engine new to this country. We expect to receive an engine, to be placed on trial, and see for ourselves what it will do before we claim any pronounced merits for it. Its arrival is expected within 30 or 40 days. We have formed a company, and it devolves upon them to satisfy us that their claims can be substantiated. Believing such to be the case, we will doubtless be prepared to put upon the market, within a short time, an engine which I believe to be fully as good, if not better than the Otto, at a much less cost. The engine to which I refer is manufactured at present in Glasgow, Scotland. I do not care to discuss its merits at present, for the reason that I desire first to give it a thorough trial. It has certainly proved very satisfactory in great Britain. In competition with the Otto at the London exhibition it gave the best of satisfaction. With what knowledge we have, we feel sure that the engine will be a success in this country. What our aims and purposes will be I cannot at present say. When we have received the engine in question and given it a fair trial we will be prepared to say what we intend doing, and you can rest assured that our first communications will be to the gas engineers of the United States.

The President suggested that the topic next on the programme—"Condensation"—be taken up for discussion. Upon request of Mr. Dunbar, who stated that there would be several gentlemen present on the following morning who were well qualified and prepared to speak upon this subject, it was decided to postpone its consideration until that time.

After the announcement of the subject next in order, "Residuals—Coke, Tar, Ammoniacal Liquors, etc.," Mr. Ramsdell spoke as follows:

It seems to me that we are laboring under very great disadvantages. There certainly should have been somebody appointed to lead off in these discussions, by presenting a carefully prepared paper on each particular subject which was to have come before the meeting. This would give us a foundation to build upon. As it now is we have nothing on which to act. However, I am not criticising the action of the President in the matter, but simply suggest this plan for our future guidance.

The President briefly remarked that he had endeavored to do exactly as Mr. Ramsdell had suggested, heartily agreeing with him as he did in his views as just stated. He wished to firmly impress it upon the minds of the members present that at the future meetings of the Association, it was of the highest importance that the papers referred to should be duly presented.

Mr. Lansden—I think I have heard our worthy President say that a company was about to be formed in the West for the purchase of gas works residuals. I would be glad to hear further from him in regard to the matter.

The President—Last February a proposition was submitted for the organization of a stock company, to be composed wholly, or in part, of those identified with the gas interests of the Mississippi Valley tributary to St. Louis, for the purpose of working up such residuals as tar, ammoniacal liquors, etc. Offers were made substantially to this effect: That such gas companies as desired to interest themselves in the project should contribute at the rate of thirty cents per ton on the annual carbonization of coal at their respective works, as their subscription towards the capital stock of the enterprise. In return for their investment they were to be paid the same price for tar that they were receiving now, and, in addition, were to enjoy one-half the profits of the venture in case it proved successful, of which there seemed but little doubt. Beyond what I have stated I am not at present in a position to speak, as the solution of the question still lies in the future.

The Association then adjourned until nine o'clock Thursday morning, May 11.

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MORNING SESSION.—SECOND DAY—MAY 11.

The Association met pursuant to adjournment, President Butterworth in the Chair.

The Committee on Applications made a supplemental report recommending for active membership the names of S. H. Douglas, Ann Arbor, Mich., Jas. R. Smedberg, New York city; S. A. Stevens, Chicago, Ills.; F. G. Tibbetts, Milwaukee, Wis.

On motion, the Secretary was instructed to cast the ballot of the Association in favor of the gentlemen named, and they were declared duly elected.

The Secretary—I find, upon looking over our accounts, that we would be a comparatively wealthy Association if we were in receipt of all the money due us. I find also bills against many gentlemen who, I really do not believe, are aware that we are holding claims against them. I am satisfied that they are all good men, and would certainly pay if they were notified of their indebtedness. I, therefore, move that the Secretary be instructed to correspond with all of our members who are found to be in arrears after our present meeting, and try to collect the balance due our Association.

The motion was carried unanimously.

CONDENSATION.

The consideration of the subject of "Condensation" being next in order, Mr. Jas. R. Smedberg, of New York, spoke as follows:

I think that all the tar carried in the gas ought to be delivered through a single pipe. Taking the tar from the bottom of the main to the gas outlet itself, I place on this last a Pelouze and Audouin condenser, from which the gas passes free from tar and fit for the action of a lowered temperature, a scrubber, and the hydrate of lime or iron oxide, or of both of these last.

In combination with the new German method of purification by superphosphates, the future of the Pelouze and Audouin condensers is yet more promising.

Of this beautifully philosophical instrument, I wish briefly to say that Messrs. Eugene Pelouze and Paul Audouin proposed and patented the breaking up of the whole gas-flow into jets of about one-fifteenth of an inch in diameter, which jets play against opposed plates with such force as to break the tar bubbles and disentangle the liquid envelope from its aeriform content. This pivotal process-patent is based on the vesicular theory of vapors, first propounded by Halley, and subsequently established by the inductive research of De Saussure, Bravais and other physicists.

Both Pelouze and Audouin were awarded the Cross of the Legion of Honor for their distinguished scientific achievements. The former has passed from earth and now wears the splendid honors of God's angels; while Mr. Audouin remains to further promote our great industry by his studies as chemist-in-chief to the Parisian Gas Light and Heat Company.

My own patent embodies the subordinate features of a combined by-pass and the non-oscillating differential gauge. The former secures compactness; the latter is a three-fold gauge, giving at will absolute inlet, absolute outlet, or differential pressure, and is provided with water columns whose calidre is three times that of the communicating water passage at the bottom. The oscillation or "jump" of the water is therefore only one per cent. of what occurs in an ordinary gauge. This gauge enables one to study with great precision the caking of the hydrate of lime in the purifying boxes. For this secondary purpose it can be mounted on the cover of the center seal. You will form your opinion of the Pelouze & Audouin condenser rather from Mr. Forstall's test-buttons than from any argument of my own.

I will conclude these remarks by saying that I wish to be near the hearts of the superintendents of small works, and have therefore been elected to full membership of your Association, as consulting engineer of the little Stockton Gas Light Company. But I have heaver batteries in my pocket, as Burtis, and Butterworth, and Lansden, and Zabriskie, and others of the "old boys" will tell you. After the isolation of thirty years, I need and ask from you a friendly welcome.

Mr. Gimper (Leavenworth)—I would like to hear from someone in regard to the separation of tar from gas by the slow and gradual process of condensation. If nothing can be said in its favor, it would seem that we are forced to admit that our method in the past has been devoid of merit, and that the idea just advanced by Mr. Smedberg is the only correct one.

Mr. Ramsdell—I will briefly state my little experience in the matter referred to by the last speaker. I was seriously troubled with tar passing over into the purifying boxes. Just what plan to adopt to get rid of the annoyance I did not know; but it was necessary to select some process different from the one then in use. Happening to run across an old vertical condenser, I placed it between the hydraulic main and the condenser already erected, since which time I have had no trouble whatever.

Mr. Douglas (Ann Arbor)—I also have had some unpleasant experience connected with this vexatious tar problem. In our works we have no exhauster, and the line of pipe extending from the hydraulic main to the condenser is some 50 feet in length, and is usually maintained at a temperature of about sixty degrees. We were troubled with the usual complaint of tar in our purifiers, so I added about 100 feet more to the pipe already in use, carrying it around the walls of the retort house and thence to the condensers. This measure, however, afforded no relief, not even the slightest diminution of the tar deposits being perceptible. That has been my experience in trying to secure slow condensation by lengthening the conducting pipe from the hydraulic main. I also tried the experiment of running steam through the condensers to ascertain the effect that might have upon the elimination of tar. The result was that there was more tarry matter carried over to the purifiers than ever before. As a last desperate expedient I went so far as to introduce a jet of steam to the scrubber, and for a time maintained that at a high temperature. This heroic treatment had, in a certain way, a very marked effect. That is, it sensibly increased the amount of tar deposited in the purifying boxes.

If I may be permitted to depart for a moment from the subject we have been discussing, I would like to say that I have enjoyed an experience in gas purification that was vastly more satisfactory than the results of my efforts as regards the matter of condensation. After trying various experiments it occurred to me that I knew of a method of purification different from any that I had yet seen practiced. I recalled the fact that, in our immediate neighborhood, there was a spring of water containing a considerable percentage of iron. Looking over the locality I found, within half a mile of the works, a mound eight or ten feet high, and about 30 feet in diameter, from the center of which the stream arose, thence overflowing it on all sides. Upon examination of the earth contained within this mound, I discovered that hydrated oxide of iron was one of its principal constituents.

I at once began to use this earth, just as it was dug from the banks, for the purposes of purification, and I have only to add that, up to the present time, it has given the most perfect satisfaction. I cannot ask for a better or cheaper material than this, costing, as it does, only fifty cents a load.

A Member—Mr. Faben, of Milwaukee, has had some experience with a hot scrubber, constructed on a plan with which few here are perhaps familiar. Will he kindly describe it and inform us of the results of its operations?

Mr. Faben—When I took charge of the works at Milwaukee, I found a hot scrubber, with twelve inch connections, already in operation. It was constructed in sections, and each section was compactly filled with three quarters or one inch steam pipes, thus forming a perfect heater. Its location was about thirty feet from the outlet of the hydraulic main. Upon examination I found large deposits of light naphthaline throughout the works and connections—so much so that on the first Sunday we thoroughly steamed out all the mains of the works, as things had come to such a pass that we were able to charge but a few retorts at a time. We then opened the catch basins of the sewers within the works, and also a wooden sewer leading therefrom, and found them all full of loose, light naphthaline. There had also been been a great deal of complaint caused by stoppages in the street services.

I then had the gas shut off from the hot scrubber, placed a coil of pipe in a retort, and used naphtha for enriching the gas. My next step was to take out the hot scrubber and sell it for old iron. Since that time we have been troubled but little by naphthaline. The hot scrubber may be an advantage where rich, fat coals are used; but, from my experience with Youghiogheny coals, it is not only no benefit but a source of great annoyance. I will also state that at Janesville, Wis., where a similar experiment was tried, the same trouble was experienced, and the hot scrubber was removed from the works at that place also.

The Association then took a recess until two o'clock, P.M.

AFTERNOON SESSION—MAY 11.

The Association met at 2:30 P.M. The Committee on Applications made an additional report recommending for active membership J. G. Miller, of Green Bay, Wisconsin, and for honorary membership, N. W. Jones and C. W. Belden, of Chicago.

On motion, the Secretary was instructed to cast the ballot of the Association, and the gentlemen named were declared duly elected to membership.

The committee appointed for the selection of a place for holding the next annual meeting of the Association, reported that they had decided in favor of Cincinnati, Ohio.

Mr. Dunbar, the chairman, stated that the committee had considered the matter thoroughly and believed it would be to the interests of the Association to hold the next meeting at the place named, in order that the many members living in Ohio might be given a chance to attend without being subjected, as they had been at our last two reunions, to so much personal inconvenience as was required in making such long journeys.

Mr. Moran here interposed with the remark that the city in which he lived (Joliet, Ills.) was, of all places, the one best adapted for holding the next meeting of the Association. He dwelt in eloquent terms on the important advantages that Joliet possessed in the way of commodious, if not elegant accommodations; but somehow his suggestions did not seem to find favor with his audience, for, on motion, it was decided unanimously that the report of the committee be concurred in, and that the next annual meeting of the Association be held in May, 1883, at Cincinnati.

The invitation from Crane Bros. Manufacturing Company, received and accepted on the previous day was then considered; and, on motion, it was decided that the Association visit their establishment on Friday, May 12, at nine o'clock, A.M.

A communication from the Pullman Car Company was then read, extending a cordial invitation to the members of the Association to inspect their works at Pullman, Ills., adding that a special car would be placed in readiness for the trip at any hour which might be named as most convenient.

The invitation was, on motion, accepted, and two P.M., Friday, named as the hour for departure, thus enabling a return at seven o'clock on the same evening.

An interesting description, illustrated with a carefully prepared model, was here given by Mr. Munzinger, of a regenerator furnace of his own construction. It would be impossible to reproduce it here without the necessary drawings. The idea, however, seemed both simple and practicable, and apparently combined the various leading improvements which have of late been made in furnaces of this kind.

The President next stated that a desire had been expressed by several of the members present for further enlightenment on the subject of

GAS AS FUEL.

Unless there was some objection thereto, the discussion of that topic would be next in order.

Mr. Gimper regretted that there was no one present to speak a good word in behalf of the slow process of condensation—the plan which had almost invariably been used in the past. Mr. Smedberg had ably championed the new method to the satisfaction probably of all present; but little or nothing had been said in favor of the system which has heretofore been so long recognized as the standard.

The following letter, from General Hickenlooper, President of the Cincinnati Gas Light and Coke Company, was then read:

CINCINNATI, OHIO, May 1, 1882.

In reply to your late communication, asking for my experience with reference to gas stoves, I take pleasure in stating that the agent here in charge reports that, from August 1st, 1881, the date on which he opened his store, up to the present time, he has set up for use in this city 971 stoves of all sizes. Estimating these to be in use say two hours daily, our increased consumption, in consequence of their introduction, would amount to something like 35,000 feet per diem. This estimate is, of course, exclusive of that used by gas engines, of which there are now about thirty in the city, ranging from two to twenty-five horse power. These engines are rapidly growing in favor, and I anticipate largely increased sales from their use during the coming year.

Respectfully,

A. HICKENLOOPER.

[To be Continued.]

## Weights of Different Woods.

In a pamphlet recently published by H. K. Porter & Co., of Pittsburgh, Pa., the following figures are given as representing the approximate weights of timber, lumber and cordwood:

*Weight of Green Logs to Scale* 1,000 *Feet, Board Measure.*

| | |
|---|---|
| Yellow pine (Southern) | 8,000 to 10,000 lbs. |
| Norway pine (Michigan) | 7,000 to 8,000 lbs. |
| White pine (Mich.) off of stump | 6,000 to 7,000 lbs. |
| White pine " out of water | 7,000 to 8,000 lbs. |
| White pine (Pa.) bark off | 5,000 to 6,000 lbs. |
| Hemlock (Pa.) bark off | 6,000 to 7,000 lbs. |

*Weight of* 1,000 *Feet of Lumber, Board Measure.*

| | |
|---|---|
| Yellow, or Norway pine | Dry, 3,000 lb.; Green, 5,000 lb. |
| White pine | Dry, 2,500 lb., Green, 4,000 lb. |

*Weight of one Cord of Seasoned Wood,* 128 *Cubic Feet Per Cord.*

| | |
|---|---|
| Hickory or sugar maple | 4,500 lbs. |
| White oak | 3,850 lbs. |
| Beech, red oak, or black oak | 3,250 lbs. |
| Poplar, chestnut or elm | 2,350 lbs. |
| Pine (white or Norway) | 2,000 lbs. |
| Hemlock bark, dry | 2,200 lbs. |

## The London "Times" and the Electric Light Companies.

The following appeared in the London *Times* of May 20:

A great number of companies have lately been formed for the purpose of practically applying recent discoveries in electrical science. The eagerness with which the shares of these undertakings are being absorbed by the public is very remarkable, considering the absence of speculation in other departments. Something must, no doubt, be allowed for the novelty of the schemes in question, something, too, for the beauty and magnificence of the results obtained from the use of electricity as a lighting agent. It is as if the astonishing effects produced by this mysterious natural force were capable of dazzling the intelligence as well as the eyes of those before whose notice it has been placed.

From one point of view, the readiness of the public to subscribe for shares in electric companies is not to be regretted. The new companies will have a fair chance of showing what they can do to redeem their promises, and in the long run the best system or systems—for it is quite conceivable that there may be several of practically equal excellence—will become established in public favor. But before that happy consummation arrives there will, we fear, be a period of some trouble and anxiety to be gone through even by the shareholders in the companies which are destined to come safely out of the struggle for existence which is evidently before them.

Without questioning the wisdom of those who hold that electric energy will evidently be largely used for illuminating purposes, it may be suggested to those who are thinking of investing in the shares of new electric companies, several of which were until within the last day or two appearing nearly every day, that they should clearly recognize that they are putting their money into a speculative and not into an established investment. The difference between the two is not always appreciated by the class of persons who rush at the shares of any new undertaking. In the present state of development of electric lighting the companies which have been formed to supply electricity for this and other purposes are, in the majority of cases, speculations. That they are, as a class, speculations extremely likely to be successful, may be fully conceded; but that they will all be successful is far from probable, and the difficulty of determining which are most likely to be so suggests the necessity of a cautious selection of their company by those who are tempted by promises of high profits.

It seems clear that no finer field than electric companies for the display of the astuteness of the promoter has been discovered for some time. The real practical value of the system of electric lighting is a matter on which only experts can decide; and those who are qualified experts in this branch of electric science are by no means numerous. The progress of invention has been so rapid that the supply of adequately instructed electricians is not at present equal to the demand for them. Another reason why people with money to invest, which they would feel the loss of, should think twice before applying for shares in an electric company, is the doubtful value of many of the patents on which reliance is placed by writers of prospectuses; not that the inventions they are supposed to protect are of no value, but that they have already been patented by someone or other Even as regards the most recent invertions, disputes have arisen as to priority, which will probably soon furnish a fine crop of litigation.

The differences between the four best known incandescent lights are almost nil to the uninstructed eye, variations in the form of the carbon filament being to all appearance the principal points in which they differ the one from the other. And each of the companies which work them has already charged one or more of its rivals with infringement of patent. Then again, what is more likely than that some new system may be invented which is as good as, or possibly superior to, those on which the companies now started into life depend.

Electric lighting and power shares may very properly be bought by those who have money which they can afford to lose without inconvenience. If they choose their company or companies well, they may not lose, but on

the contrary may gain profits, which ought to be proportionate to the risk run. But those who cannot afford to go without a return for their money, and whose circumstances may compel them to realize at an unfavorable moment, ought to be very sure indeed, not only of the financial *bona fides* of the company, but also of the practical efficiency of the electric system it is to work, before they buy its shares. Above all, let them beware of thinking that, because there was lately an enormous rise in "electric lights," the shares they think of applying for will rise to. In the first place, every fresh issue necessarily reduces in some degree the market value of all securities of the same class as itself. When new issues are numerous and frequent, the effect on the value of the mass of existing capital is sure to be perceptible after a time. In the next place, there are strong reasons for thinking that the rise in question was not wholly due to the merits of the undertakings concerned, but partly to market manipulation; that it was, in fact, due to a "corner."

The heavy fall that has occurred this week may perhaps convince the skeptical that the market was a dangerous one for a speculator who was not "in the swim" to meddle with. Any market, however large, may be "cornered," as we saw in Liverpool last year, if a sufficint number of speculators have sold "for the fall." The electric light market is a small market—a ridiculously small market, considering the noise it has made—and is consequently easily manipulated by a few powerful operators, especially with the public to help them by taking up the shares freely.

## Secondary Batteries.

*Engineering News*, of June 10th, devotes considerable space to an article on this subject; and, while not adding much that is new on this topic, presents in a concise and clear manner what has been thus far accomplished by electrical engineers in this direction. Progress, we know, is sometimes slow; and it would appear to us that the devisers of schemes for purposes of electrical storage are somewhat tardy in completing the brilliant promises made some time ago. The article is as follows:

Long ago it was observed that if the current from a pile was passed through a voltameter—two platinum points immersed in a jar of acidulated water—a decomposition of the water resulted, depending in its violence on the strength of the current. If this circuit was broken, and the two wires leading from the voltameter joined to a detector or galvanometer, a deflection took place showing that there was a reactionary movement in the voltameter itself. Later experiments were made to show that this secondary current moved in a direction contrary to that of the exciting current. Al most any elements, placed in a proper conducting medium, will yield a secondary current after having been subjected to the influence of a battery. Up to the present time lead in dilute sulphuric acid has been found to produce the most satisfactory results, and it is our object in the following remarks to examine the causes which produce the second current and also to see if the factors of loss are so great as to seriously interfere with the practical application of the apparatus.

In no sense whatever is the secondary battery an accumulating or storing battery of electricity—electricity has not yet been bottled, and never will be unless it happens at the same time that all motion is caught and caged. We know that the appellations were first used figuratively, nevertheless they should be expunged. So far as the subject is known at present electricity seems to be a motion of the atoms constituting the medium through which it acts, and is itself created by a motion which may be mechanical as in the dynamo, or the outcome of chemical action as in the pile.

Another fact in regard to electricity is what has been aptly termed its interchangeableness. By power we move a dynamo and generate a current; conversely a current produces decomposition. In the first instance the greater the amount of power expended the greater will be the result; the same is true of the next, the more intense the chemical affinities the greater will be the effect.

In the Faure secondary battery the exciting current produces a decomposition or change in the lead elements which will result in a recomposition upon its cessation. The plates are covered with an oxide of lead, and immersed in dilute sulphuric acid. No chemical affinity being present there is no action, and it now become the duty of the electric current while passing through the battery to so change the elements that there will, upon its stoppage, be such a chemical action as will produce the secondary current. The oxide of lead manually placed on the plates and held in position by covering of parchment undergoes a change; that on one element becomes a peroxide, while the oxygen from the other leaves it, and the spongy mass of lead is the result. We now have in the battery after the action has ceased two elements immersed in a suitable medium, which have a strong chemical affinity for one another. From this point the action of the battery is essentially the same as that in any chemical pile; oxygen from the peroxide element is liberated; the reduced lead is recomposed and becomes the oxide just destroyed, the result being the re-developing of a portion of the current of electricity which was required to produce the change.

In this, as in any battery, the strength of the current and its duration depend upon the violence of the chemical action and the superficial area of the elements. Also, as in other cases, if a rest be allowed after the current has weakened from continuous action, a large percentage of the strength of the first current will be perceptible in the second. This is for precisely the same reason as the recovery in the ordinery battery.

The commercial success of batteries constructed upon this principle will depend upon the cost of manufacture, size and economy. The cost of manufacture is comparatively small, and as the destruction of material is also small, the question may be omitted at present. The size is a great drawback, and until it is reduced most considerably it is not probable that secondary batteries will be located in residences and taken in wagons daily to a central station to be "charged." The actual cost of running is the most important factor in the problem, and as the steam engine may be taken as the generator, the question will be, ultimately, How much electricity can be obtained by the consumption of one pound of coal? As the losses from the method of burning the coal, from the engine and from the dynamo are for the same secondary battery as for the dynamo current direct, we will only consider the loss occasioned by the use of the battery.

It is a well-known, though often disregarded law, that the nearer the work can be done to the generating power the greater will be the effect obtained. The nearer coal can be burned to the pit's mouth the less will be the cost of manufacture; the nearer a lathe can be run to the engine the smaller will be the cost of running that lathe. Every additional operation, every moment of time and every foot of distance intervening between the cause and effect produce additional cost. In this instance what is applicable in mecanics is pertinent in chemistry.

In secondary batteries there are many steps, at each one of which a little is taken from the final result. All the current from the dynamo cannot be utilized in producing the chemical changes; the time intervening between the periods of charging and using causes a loss; the final chemical action will not produce even an amount of current equal to the initial current minus the loss in charging and the time. Something is lost at each step, but just what percentage of the whole has not yet been determined.

The results of a series of experiments carried on at the Conservatorie des Arts et Metiers at Paris form the most authentic account yet obtained of the working of these batteries. They were charged by a Siemens dynamo machine, careful note being made of the required power. The resulting current was used to light the Maxim incandescent lamp, and the return of the cells was about 90 per cent. considered as electrical quantity. But in respect to work done, it was demonstrated that the battery returned only 40 per cent. of the amount required to charge it, and 60 per cent. of the energy actually stored up by it. This refers only to disposable electric energy. It is probable that if the current had been transformed into mechanical work the amount would have been smaller. The power required to charge the battery was equivalent to one horse power acting during 35 hours and 26 minutes; only 66 per cent. of the work expended was received by the battery, and only 60 per cent. of this was given back by the battery.

## Illumination of Mines.

The French Fire Damp Commission appointed on January 8, 1878, for the purpose of considering the methods best calculated to obviate disasters in mines occasioned by fire damp, have made their report. Section four of this report deals with the illumination of mines, and is as follows:

"Numerous experiments have proved that lamps protected by a simple wire guaze readily allow the flame to pass under the action of a current of gas more or less violent. The Belgian Mueseler lamp is that which has hitherto given the best results, affording a measure of safety incomparably greater than the others; and the commission strongly recommends its use. The circumstance should be mentioned, however, that it has been found possible to cause the flame to pass through the gauze by projecting on to the lamp a strong vertical current of fire damp in a downward direction. It would also be advisable to try in practical use a new lamp proposed by M. Marsant, engineer, which has well stood the tests applied to it. There is only one fault that can be found with it—viz., the wire gauze is hidden by a screen, which prevents the presence or absence of the former from being ascertained at a glance.

"Electric lighting may render real service to miners in certain cases; but incandescent lamps can alone, however, solve the problem. The commission does not recommend this system, fearing the danger which may result from the use of high-tension currents; thus agreeing with Dr. Siemens, who regards them as dangerous. As to perpetual lamps, which burn the fire damp as it is disengaged, this proceeding is very dangerous and absolutely illusory; for one such lamp does not burn much more than 0.635 cubic feet of gas per hour."

[From the London "Journal of Gas Lighting"]

## The Ammoniated Superphosphate Process.

Dr. H. Bünte, of Munich, last autumn visited this country for the purpose of examining into and reporting upon the results of the experiments then in progress at the South Metropolitan Gas Works with Bolton and Wanklyn's patented process for the purification of gas from ammonia. Since his return he has, in conjunction with Dr. Schilling, carried out a series of trials with the process at the Munich Gas Works; the following being a translation of a report as to the results obtained:

### FIRST TRIAL.

Since Oct. 17 last year a series of trials with Bolton and Wanklyn's "Dry Process for the Removal of Ammonia from Coal Gas" have been made at the Munich Gas Works. The process mainly consists in passing the crude gas, after the removal of the tar, through a purifier filled with superphosphate laid on trays. While passing through the latter the ammonia is absorbed, and forms an ammoniated superphosphate—a product which, on account of its composition of phosphoric acid and nitrogen (ammonia) is a valuable manure. For the purpose of these trials a quantity of superphosphate containing 18.7 per cent. of soluble phosphoric acid was employed. This material was, in accordance with the working instructions of the patentees, treated in the following manner:—About 30 cwt. of superphosphate was spread on the oxide floor, and saturated with about 75 liters of gas liquor; while it was turned over at the same time, so as to impregnate it fairly. The purpose of this treatment was—(1) To neutralize the free sulphuric acid in the superphosphate, which might have a deleterious effect on the illuminating power of the gas by absorbing the heavy hydrocarbons. (2) To render the finely-powdered material porous, by setting the carbonic acid and the sulphuretted hydrogen free, and thus to increase its capacity of absorbing the ammonia.

In the beginning of the trials a layer of 10.15 centimeters of superphosphate was put into an ordinary purifier, the lower part of which was covered with sawdust, to keep off the last traces of tar. This purifier was used for several days without interfering in the least with the work. After passing the purifier, the gas only contained a very small quantity of ammonia, averaging 0.56 grammes per 100 cubic meters (the quantity allowed in England is 11.4 grammes per 100 cubic meters); while the gas, after passing through the scrubbers—though these were amply supplied with gas liquor—contained 60 grammes per 100 meters.

This process was interrupted by the requirements of the increasing winter production. As the purifier used could not be spared (being required for oxide of iron), a cylinder, about 3 meters in diameter and 2 meters high, was procured instead and placed behind the scrubber. In this cylinder were placed four layers—the two lower ones of sawdust for the absorbtion of tar, the two upper of superphosphate, 15 centimeters thick.

During the winter months this apparatus was too small for the passage of from 700 to 800 cubic meters of gas per hour, requiring a pressure of from 5 to 10 centimeters. It was therefore mostly used in the daytime only, and disconnected at night. Meanwhile gas liquor was used in the scrubbers as before.

During the progress of these trials, continuous observations were made to test the quantity of ammonia in the gas, both before entering the apparatus and after leaving it. These tests showed that before entering the apparatus 100 cubic meters of gas contained 97 grammes of ammonia; while after leaving it there were only from 1 to 2 grammes per 100 cubic meters. We found, as a matter of course, that with the increasing impregnation of the superphosphate with ammonia the percentage of ammonia in the gas after leaving the apparatus increased, and after a complete saturation of the superphosphate the gas contained about as much ammonia after passing through it as before. As soon as the gas showed a larger quantity of ammonia, the purifier was disconnected and the material used was removed and replaced by a fresh supply of superphosphate. We had only one apparatus at our disposal, and therefore could not do anything to remove the last traces of ammonia.

During a continued series of trials (21 tests in 15 days) the gas entered the purifier with 60 grammes of ammonia, and left it with an average of 8 grammes of ammonia per 100 cubic meters. The effect of the crude gas altered materially the condition of the superphosphate. It changed the color of the light-brown powder nearly to black, and produced a compact but porous dry cake. Generally the lower layer only showed this condition, while the top one was blackened and caked on the surface, but otherwise less used up, as the crude gas had not yet sufficiently impregnated it. The increase of the pressure is partly necessitated by the caking of the superphosphate, but principally is the consequence of the tar in the sawdust. No tar at all was afterward found in the superphosphate.

These trials were carried on with interruptions from the 23d of November to the 10th of March, and the apparatus was refilled eight times; the top layers of superphosphate being put to the bottom, while fresh superphosphate was put on top.

Various tests at different places gave the following average results, the daily production of the system used being from 15,000 to 20,000 cubic meters:

| | Grammes of Ammonia. |
|---|---|
| 1. After the hydraulic, 100 cubic meters of gas contained... | 427.0 |
| 2. Before the condensers, " " " ... | 388.0 |
| 3. Before the scrubbers, " " " ... | 220.0 |
| 4. Behind the wet scrubbers, " " " ... | 59.5 |
| 5. Behind the superphosphate purifier, " " ... | 3.4 |
| 6. In the gasholder, " " " ... | 0.3 |

The gas liquor, after sundry pumpings, contained 19.2 grammes of ammonia per liter.

### SECOND TRIAL.

After the middle of March, the smaller consumption of gas allowed us to discontinue the use of the gas liquor in the scrubbers, without fear of too great a pressure being required on account of the tar clogging up the sawdust. The make of gas was about 800 cubic meters per hour. The resistance in the apparatus was between 1 and 3 centimeters. In consequence of this discontinuation of irrigation, the quantity of ammonia behind the scrubbers increased in a few days from an average of 60 to about 108 grammes. The gas after leaving the apparatus showed in the beginning 8 to 9 grammes; later on the average was 12 grammes per 100 cubic meters. With the increasing saturation of the superphosphate, this quantity reached after six days 59 grammes per 100 cubic meters. The apparatus was then emptied and refilled. Both layers were strongly saturated.

The product was powdered and mixed. While the superphosphate strongly reddened the test-paper, the ammoniated superphosphate only did so in some places, and proved fully neutral or weakly alkaline. The latter showed on an average 7.5 per cent. of ammonia and 0.46 per cent. of sulphocyanide.

As the patentees maintain that a principal advantage of their process consists in the production of a valuable manure in the form of ammoniated superphosphate, we now have to consider the financial side of the process, viz.:—(*a*) The quantity of ammonia which can be fixed by the superphosphate. (*b*) To investigate whether it will be more advantageous (1) to continue scrubbing with gas liquor, or (2) to fix the ammonia by Bolton and Wanklyn's process in using superphosphate.

On the first point the before-mentioned trials gave sufficient information. The trials were made with Saar coals, Henitz I., from 1,000 kilos. of which 300 cubic meters of gas and 100 liters (10 per cent.) of gas liquor were produced.

Numerous tests showed that 1,000 kilos. of coal gave 2,130 grammes, equal to 4.68 lbs. of ammonia. The quantity is distributed as follows:

*Case No.* 1.—After repeated scrubbing with gas liquor, we found in the latter—

| | | | |
|---|---|---|---|
| Ammonia | 1,950 grammes | = | 9.15 per cent. |
| And there remained in the gas (60 grammes in 100 cubic meters | 180 " | = | 8.50 " |
| Total per 1,000 kilos. of coal, | 2,130 grammes | = | 100.00 |

By the superphosphate process only 8.5 per cent. of the total quantity of ammonia would be obtained, while the larger portion would be contained in the gas liquor.

*Case No.* 2.—If the use of the gas liquor in the scrubber be discontinued, the scrubber will only perform the function of separating the tar from the gas. After passing through the scrubber the gas will contain 108 grammes of ammonia per 100 cubic meters; of these about 100 grammes are absorbed in the superphosphate, while 8 grammes are lost in the purification. In this case the distribution will be as follows:

| | Ammonia per Ton of Coals. | | |
|---|---|---|---|
| In gas liquor | 1,806 grammes | = | 84.8 per cent. |
| In superphosphate | 300 " | = | 14.1 " |
| Lost | 24 " | = | 1.1 " |
| Total | 2,130 grammes | = | 100.0 |

*Case No.* 3.—If the scrubbers are entirely put aside, and the gas, containing as before mentioned about 220 grammes of ammonia, passes through the superphosphate purifier (the tar having been previously separated, perhaps by a Pelouze and Audouin apparatus), the distribution will be as follows:

| | Ammonia per Ton of Coals. | | |
|---|---|---|---|
| In gas liquor | 1,470 grammes | = | 69 per cent. |
| In superphosphate (and loss) | 660 " | = | 31 " |
| Total | 2,130 grammes | = | 100 |

In these three cases the dry superphosphate purification will show the following results:

| | Case No. 1 (with wet scrubbing). | Case No. 2 (with dry scrubbing). | Case No. 3 (without scrubbing). |
|---|---|---|---|
| 1. 100 cubic meters of gas require of superphosphate—kilos. | 0.8 | 1.33 | 2.93 |
| 2. 100 kilos. of superphosphate will purify cubic meters of gas | 12,500 | 7,500 | 3,410 |
| 3. 1 ton of coal purified with superphosphate will give | 0.18 | 0.30 | 0.66 |
| 4. 1,000 cu. meters of gas purified by superphosphate will give | 0.6 | 1.0 | 2.2 |

As to the financial view of the question, the purification process of Bolton and Wanklyn produces the ammoniated superphosphate. The proportion of ammonia of this material gives the measure for the increased value which the superphosphate has acquired by the process of purification. The trials have given a product which contains 7.48, say 7½ per cent. of ammonia. If we do not take into consideration the effect of the sulphocyanide, and of the fact that the soluble phosphoric acid has been re-precipitated, it will be found that the useful parts of the superphosphate have not undergone any important alteration detrimental to its agricultural value. [7.5 kilos. of ammonia per 100 kilos. of superphosphate are equal to 7.5 × 3.88 = 29.1 per cent. respectively; 29.1 kilos. of sulphate of ammonia per 100 kilos. of the product.

The ammoniated superphosphate which has hitherto come into the market is produced by mixing superphosphate with sulphate of ammonia distilled from gas liquor. In order to obtain a manure equal in value to the saturated superphosphate, it would be necessary to add to 100 kilos. of superphosphate 29.1 kilos. of sulphate of ammonia. The price of the latter varied in the course of the last year between 38 and 42 marks per 100 kilos.; consequently 1 kilo. of ammonia (25 per cent of ammonia per 100 kilos.) would average 1.60 marks. For various reasons this price cannot be obtained at present for the superphosphate, after having served for gas purification. There is no doubt that the ammonia in the superphosphate can be sold at a higher rate than in gas liquor. Consequently it would be advisable to collect the ammonia by means of superphosphate, and to give up the old-fashioned way of scrubbing.

To conclude, we may resume the results of the trials hitherto made, which are still being continued. Bolton and Wanklyn's process for removing the ammonia in the dry way, by means of superphosphate, has hitherto not shown any disadvantage in the manufacture of gas. The illuminating power is thereby not deteriorated. The absorption of the ammonia from the crude gas by the superphosphate is done quickly and nearly completely. The gas, after passing the purifier, really contains a smaller amount of ammonia than what is generally considered admissible in pure gas. This is also the case when no gas liquor is used in the scrubber. If the tar has been previously extracted from the crude gas by means of a well-known apparatus, it is easier to separate more completely the ammonia by the superphosphate than by the treatment of gas liquor. By scrubbing with pure water a comple absorption of the ammonia can no doubt be obtained, but then the gas liquor will turn out weaker, and by using a larger quantity of pure water the illuminating power may be deteriorated. The ammonia in the ammoniated superphosphate will be of a higher value than the ammonia in gas liquor. In cases where gas works do not derive any benefit from the ammonia, especially in smaller works, this process entirely offers an opportunity for realizing at least a portion of the ammonia in a marketable form, and without material alteration of the plant

(Signed) H. Bunte.

[We had the honor of being present with Dr. Bünte at the South Metropolitan Works last year, when he was investigating the above subject, and have been looking for the above statement for some time. The character of Dr. Bünte for honest, reliable, and unprejudiced investigation is so well known in Europe that it would be entirely unnecessary to refer to it there, as his signature would be ample guarantee for the care and fidelity with which any investigation was made. The use of the superphosphates for gas purification may be of considerable importance in some sections of this country where they are found in a native state.—Ed. Am. G. L. J.]

## Electric Light at Niagara Falls.

At a special meeting of the Trustees of the village of Niagara Falls, N. Y., held May 4, 1882, there were present S. T. Murray, President, and Messrs. Brooks, Donohue, and Vanney, Trustees.

The reading of the minutes of the last meeting was dispensed with.

The Committee on Street Lights reported favorably to the use of nine electric lights, at $130 each light of 2,000-candle power, to be located anywhere within the bounds of the village the Trustees may designate; to be lighted at twilight and put out at daylight, for each and every night of the year commencing as notice is given the Board of Trustees that all the lamps are lighted, and ending one year thereafter; and that the four electric lights now erected shall be paid for at same rate, commencing May 1st, and that the electric light company shall give satisfactory guarantee that the lights shall be lighted uninterruptedly all night and every night of the year.

It was moved that the report of the Committee be accepted and adopted; thereupon Mr. Donohue called the ayes and noes on the question. M. Donohue voted no; Wm. Vanney voted aye; M. Brooks voted aye; S. T. Murray voted aye. Three ayes and one no; carried.

The Committee further reported upon the matter of lighting with gas that the Niagara Falls Gas Light Company had made a concession of $2 per lamp post per year, and they recommend the lighting of 50 lamps at $23 per lamp, to be lighted, put out, and cleaned by the company; and that they be lighted and put out by the calendar; and that if any additional lamps and posts be erected, the same price be paid per lamp and under the same conditions.

Upon motion, the report of the Committee was adopted and the clerk directed to at once notify the said companies of the action of the Board.—Niagara Falls *Gazette*.

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To the Editor of the Niagara Falls *Gazette*:—

At the last meeting of the Board of Trustees the Committee on Street Lights made a report which was adopted by the Board establishing nine electric lights for the ensuing year. The Committee, not wishing to take the responsibility of locating the same, asked the Board to assist, which they have done this day, to wit, May 8th; and the following is the result of their deliberations, after carefully looking over the whole territory embraced within the limits of the village, the object being to conserve the interests of the taxpayers and inhabitants of the village by lighting where perhaps at present it would be impracticable to ask the gas company to extend their mains. Other cities and villages similarly situated have adopted the electric light, and in the judgment of the Board the lights are so placed as to give the taxpayers the benefit of this, to us all a new system of lighting, which in the near future perhaps may determine whether, as a practical light, considering expense and all other conditions, it is or is not the light of the future. Your public servants cannot determine this. It must be by the judgment of the people; and we have so placed the lights that all may see, judge, and direct for themselves what the future policy may be. It is true we have not placed the lights in front of the habitations of the most prominent taxpayers; still it is equally true we have placed them where the largest taxpayers have a most important interest, as well as to accommodate the most numerously inhabited streets and thoroughfares of our village. The lights are to be placed as near as may be to the time of lighting by the 17th of May, as follows:

1st. Corner Main and Falls streets.
2d. Falls and Second streets.
3d. Buffalo and Main streets.
4th. Ontario and Main streets.
5th. At the railroad crossing on Third and ext. Fourth street.
6th. Fourth and Niagara streets.
7th. Ferry and Fifth streets.
8th. Ontario street near Samway's residence.
9th. Cascade street, river front opposite A. H. Porter's stone shop.

All these lights will be each 2,000-candle power. The Committee have contracted, by authority of the Board, for an additional light of 50 gas lamps at $23 per post per year, with the Niagara Falls Gas Light Company. The oil lamps now in use will be discontinued, many of them being displaced by the electric lights. It must be borne in mind that the electric lights will be lighted by twilight and put out by daylight every night of the year. This is the contract. The gas lights will be by the calendar. You will please bear in mind that of all the lighting by the two several systems it is proposed to keep within the appriation the taxpayers have voted to be taxed for public lighting.

We think it would be out of place to express an opinion as to the result of this action and determination of the Board. The two phases of the question are before you to judge according to the evidence, as you may see a practical exhibition of both, and then determine intelligently as you may, and direct your public officers in the future. Too much credit cannot be given the Committee on Street Lamps for their close examination of the subject.

Let us not forget the established institution of our town, which has so long done the entire lighting of the village. They have voluntarily reduced their price from $25 to $23 per post per year. Yours very truly,

S. T. Murray,
Pres. of Village.

## The Manufacture of Patent Fuel in France.

Commercial Agent Gifford, of Nantes, has submitted to the Department of State an interesting account of the manufacture of patent fuel out of the coal dust which was formerly rejected as worthless, and which is now burned in immense quantities in France as coal bricks. The millions of tons of coal dust, the waste of our mines, renders this process of some interest, as the subject has long occupied the attention of large consumers of coal. After importing the dust from Wales and paying duties and cost of handling, the manufactured article in France costs $4.42 to $4.87 per ton. It is claimed, besides its advantages for manufacturing and locomotive purposes, that it is superior to other coal for domestic purposes. For some years the Orleans Railway Company has bought annually 60,000 tons. The cost in the United States, it is claimed, would be less.

The process of manufacture is given as follows: "It is extremely simple. The coal dust is mingled with pitch (*brai mineral*) derived from coal tar, and the mixture poured into cups attached to a belt, each cup containing just enough material for a brick of the size desired. The belt in its movement passes this material through a chamber where it is exposed to hot steam, which fuses the two substances into a homogeneous mass. This is poured by the descent of the belt into moulds, where it is subjected to an enormous pressure by a hydraulic press, or by machinery set in motion by a steam engine. The brick is square in form, its thickness being about one-third of its other dimensions, and, as manufactured here, weighs 5, 10, or 15 pounds."—*Coal Trade Journal.*

## Public Lighting in New York City.

The officers designated in section 1 of chapter 478 of the Laws of 1879, met in the office of the Mayor, at 12:30 P.M., on Monday, April 17, 1882.

All were present viz.:

Hon. Wm. R. Grace, Mayor; Hon Allan Campbell, Comptroller; Hon. Hubert O. Thompson, Commissioner of Public Works.

The minutes of the meeting of March 27, 1882, were read and approved.

The Secretary presented the following report:

BUREAU OF LAMPS AND GAS, March 28, 1882.
DEPARTMENT OF PUBLIC WORKS,

To the Honorable the Mayor, the Comptroller, and the Commissioner of Public Works:—

In compliance with the resolution adopted on the 27th inst., directing the Secretary to examine and report upon the several proposals received on said date, I respectfully submit the following report:

First—As to gas lamps. * * * * * * * * *

The rates are the same as now paid all the gas companies under the existing contracts.

The United States Illuminating Company propose to light by voltaic arc lights, of 2,000 candle power, at 70 cents per night for each lamp, the streets and parks shown in the following statement, and was the only bidder for furnishing electric lights to same. The same streets and parks, however, are included in the proposals of the New York, Manhattan, and New York Mutual Gas Companies.

District bid for by the United States Illuminating Company, with the estimated number of electric lamps stated to be necessary to light the same; also the estimated number of gas lamps which can be displaced:

| | Number Electric Lamps. | Gas Lamps Displaced. |
|---|---|---|
| Broadway, from Battery Park to 14th street .... | 52 | 256 |
| Battery Park..... | 12 | 144 |
| City Hall Park..... | 10 | 110 |
| Fifth avenue, from Washington Park to 14th st. | 8 | 43 |
| Washington Park ..... ..... | 12 | 152 |
| Total..... | 94 | 705 |

—or one electric lamp to seven and a half gas lamps.

| | |
|---|---|
| 1 electric lamp per night..... | $0 70 |
| 7½ gas lamps, at $17.50 per year, 4.8 cents per night is... | 0 36 |
| Excess per night for 1 electric lamp over 7½ gas lamps, | $0 34 |
| Or 1 electric lamp per year at 70 cents per night is..... | $255 50 |
| 7½ gas lamps per year at $17,50 each is..... | 131 25 |
| Excess per year for 1 electric lamp over 7½ gas lamps, | $124 25 |
| Or, 94 electric lights 1 year at 70 cents each per night is ..... ..... ..... | $24,017 00 |
| 705 gas lamps at $17.50 each per year is..... | 12,337 50 |
| Excess for electric lights for 1 year ..... | $11,679 50 |

The Brush Electric Illuminating Company presented two bids. One was for furnishing voltaic arc lights of 2,000-candle power (French measurement) for streets, and clusters of six 6,000-candle power lights for two parks, at the rate of 70 cents per night for each 2,000-candle power on the streets and parks shown in the following statement, and it was the only bidder for electric lights on these streets. The Manhattan, Metropolitan, and New York Mutual Gas Companies included these places in their respective proposals.

District bid for by the Brush Illuminating Company, with the estimated number of electric lights stated to be necessary to light the same; also the estimated number of gas lamps which can be displaced:

| | Number Electric Lamps. | Gas Lamps Displaced. |
|---|---|---|
| Broadway, from 14th to 34th street..... | 13 | 99 |
| 4th avenue, from 18th to 34th street ..... | 17 | |
| Park avenue, from 34th to 42d street..... | 8 | 294 |
| 4th avenue, from 42d to 59th street..... | 16 | |
| Madison avenue, from 27th to 59th street..... | 33 | 186 |
| 5th avenue, from 14th to 59th street..... | 41 | 264 |
| 8th avenue, from 14th to 59th street..... | 46 | 300 |
| 14th street, from 4th to 8th avenue ..... | 9 | 53 |
| 23d street from 4th to 8th avenue..... | 9 | 44 |
| 34th street, from 4th to 8th avenue ..... | 10 | 44 |
| 42d street, from 4th to 8th avenue ..... | 11 | 50 |
| 57th street, from 4th to 8th avenue..... | 11 | 41 |
| 59th street, from 4th to 8th avenue..... | 11 | 31 |
| Madison Square, 1 pole, six lights, equivalent to 16 street lamps..... | 16 | 141 |
| Union Square, one pole, six lights, equivalent to 16 street lamps..... | 16 | 85 |
| Total..... | 272 | 1,632 |

—or one electric lamp to six gas lamps.

Or for such portion of these spaces and such number of lamps, at said price, as may be prescribed by the Gas Commission.

| | |
|---|---|
| 1 electric lamp per night..... | 70 cts. |
| 6 gas lamps per night at 4.8 cts. each..... | 28.8 " |
| Excess per night for 1 electric lamp over 6 gas lamps.. | 41.2 cts. |
| Or, 1 electric lamp per year at 70 cents per night ..... | $255 50 |
| 6 gas lamps per year at $17.50 each..... | 105 00 |
| Excess per year for 1 electric light over 6 gas lamps... | $150 50 |
| Or, 272 electric lamps 1 year at 70 cents each per night..... | $69,496 00 |
| 1,632 gas lamps 1 year at $17.50 each..... | 28,560 00 |
| Excess for electric lights for 1 year..... | $40,936 00 |

The contract of the Brush Company was for lighting the High Bridge and its approaches from 16 to 32 electric lights, more or less, at $1 each lamp if the city furnishing the steam, or $1.50 each lamp if steam is furnished by company. On this bridge and its approaches are 24 gas lamps now lighted by the Harlem Gas Light Company at $19.50 each per year.

The following shows the district now lighted by the Brush Electric Illuminating Company:

| | Number Electric Lamps. | Gas Lamps Displaced. |
|---|---|---|
| Broadway, from 14th street to 34th street..... | 23 | |
| 5th avenue, from 14 street to 34th street..... | 16 | 253 |
| 14th street, from 4th avenue to 5th avenue .... | 1 | |
| 34th street, from Broadway to 5th avenue ..... | 3 | |
| Union Park, 1 pole, 6 lights, equivatent to 16 street lamps ..... | 16 | 181 |
| Madison Park, 1 pole, 6 lights, equivalent to 16 street lamps ..... | 16 | |
| Total..... | 75 | 434 |

In the new bid the company reduce the number of lamps now on Broadway by five, which would make the total number of lamps in present district 70, againt 434 gas lamps displaced, or 1 electric light to 6 1-5 gas lamps.

| | |
|---|---|
| 70 electric lights one year at 70 cents each per night.. | $17,885 00 |
| 434 gas lamps one year at $17.50 each.. ..... | 7,595 00 |
| Excess for electric lighting in present district..... | $10,290 00 |

The total result of the United States bid and the first Brush bid is as follows:

| | |
|---|---|
| 366 electric lamps one year at 70 cents each per night, | $93,513 00 |
| 2,337 gas lamps, one year at $17.50 each..... | 40,897 50 |
| Excess for electric lights ..... | $52,615 50 |

It will be seen that the Brush Company propose to call the 6 lamps in Union Park equivalent to 16 lamps, and the same with the 6 lamps in Mad ison Park. That is to say that for the 6 lamps in Union Park they will charge for 16 lamps, and for the 6 in Madison Park they will also charge for 16. Now 12 street lamps on each of these parks will light these places in a very much better manner than the same are now lighted by the mast, and will displace a greater number of gas lamps than are now displaced by the lamps on the masts.

The bid from the Automatic Gas Lamp and Lighting Company was for lighting lamps in Central Park by naphtha gas (that is to say, by means of naphtha contained in a tank or reservoir placed on the lantern), at $27 each per year.

There are 63 of these lamps now in Central Park which were erected by this company under a resolution of the Department of Parks, giving them permission so to do, providing the lamps were erected and lighted without expense to said Department. The Department of Parks has not advised nor requested the Gas Commission or the Commissioner of Public Works to have these lamps lighted.

All of which is respectfully submitted,

S. McCormick, Supt. Lamps and Gas,
Secretary.

* * * * * * * *

The Commissioner of Public Works offered the following:

Whereas, Neither the Commissioners of the Department of Public Parks or the Common Council have advised or requested the Gas Commission or the Commissioner of Public Works to have any portion of the Central Park lighted by means of naphtha, and as the city has no lamps on said park, except such as are now lighted by illuminating gas at $17.50 per year,

Therefore, Resolved, That the proposal of the Automatic Gas Lamp and Lighting Company for lighting lamps in Central Park by means of naphtha be not considered.

The Chairman put the question upon agreeing with the same, and it was decided in the affirmative.

The Commissioner of Public Works offered for adoption the following resolution:

Resolved, That an award of contract be made to the Brush Electric Illuminating Company of New York for lighting by the voltaic arc system of electric lighting the following streets and parks, to wit: Broadway, from 14th to 34th street; 5th avenue, from 14th to 34th street; 14th street, from 4th to 5th avenue; 34th street, from Broadway to 5th avenue; Union Park and Madison Park, for the period from May 1, 1882, to April 30, 1883, both days inclusive, at the rate bid in their proposal of March 27th, 1882, viz.: at the rate of 70 cents for each lamp per night.

The lamps on the streets to have not less than 7-16 inch carbons, and the lamps on Union and Madison Parks, if elevated on the masts now there, to have not less than ½-inch carbons, and the 6 lamps on each mast shall be considered as equivalent to 12 lamps on each. The said rates to include the furnishing, fitting up, and maintaining all the lamp posts, lamps, poles, wires, and conductors, and each and every article which may be required for such lighting. The number and location of all the lamps to be designated by the Commissioner of Public Works.

The Chairman put the question upon agreeing with the same, and it was decided in the affirmative.

The Commissioner of Public Works offered for adoption the following resolution:

Resolved, That an award of contract be made to the United States Illuminating Company for lighting by the voltaic arc system of electric lighting the following public parks and streets, to wit: Battery Park; City Hall Park; Washington Park; 5th avenue, from 14th street to Washington Park; and Broadway from south side of Canal street to 14th street, for the period from May 1, 1882, to April 30, 1883, both days inclusive, at the rate bid in their proposal of March 27, 1882, viz., for the sum of 70 cents for each lamp per night. The lamps to have not less than 7-16 inch carbons, and the said price to include the furnishing and fitting up and maintaining all the lamp posts, lamps, poles, wires, and conductors, and each and every article which may be required for such lighting; and the number and location of the lamps shall be designated by the Commissioner of Public Works.

The Chairman put the question upon agreeing with the same, and it was adopted.

* * * * * * * *

The following is a summary of the awards of contracts for furnishing the illuminating material for and lighting, extinguishing, cleaning, repairing, painting, and maintaining the public lamps in the city of New York for the period of one year, commencing May 1, 1882, and ending April 30, 1883, under the foregoing resolutions:

GAS LAMPS.

| Company. | Gas. | Lamp-Post straightened. | Column reseated. | Column refitted. | Lamp removed. | Lamp reset. | New Lamp fitted up |
|---|---|---|---|---|---|---|---|
| New York | 17 50 | 1 50 | 1 50 | 3 50 | 3 50 | 10 | 10 |
| Manhattan | 17 50 | 1 50 | 1 50 | 3 50 | 3 50 | 10 | 10 |
| Mutual | 17 50 | 1 50 | 1 50 | 3 50 | 3 50 | 10 | 10 |
| Metropolitan | 17 50 | 2 | 2 | 3 | 3 | 8 | 8 |
| Harlem | 19 50 | 2 50 | 2 50 | 3 50 | 3 50 | 8 | 8 |
| Central | 29 00 | 1 50 | 1 50 | 1 50 | 3 50 | 8 | 8 |
| Northern | 32 00 | 1 50 | 3 50 | 3 00 | 3 00 | 8 | 8 |
| Yonkers | 39 00 | 1 | 1 | 1 00 | 1 50 | 8 | 10 |

ELECTRIC LAMPS.

Brush Electric Illuminating Company, at 70 cents for each lamp per night. The district will require about 67 lamps. Broadway, from 14th to 34th street; 5th avenue, from 14th to 34th street; 14th street, from 4th to 5th avenue; 34th street, from Broadway to 5th avenue; Union Park and Madison Park.

United States Illuminating Company, at 70 cents for each lamp per night. The district will require about 65 lamps. Broadway, from Canal to 14th street; 5th avenue, from Washington Park to 14th street; Battery Park, City Hall Park, and Washington Park.

The above prices for electric lighting to include each and every cost of maintenance.

S. McCormick, Supt. Lamps and Gas,
Secretary.

## Death of Mr. Keates.

A large circle of our readers will share in the deep feeling of regret which we experience in announcing the death of Mr. Thomas Keates, F.I.C., the Consulting Chemist and Superintending Gas Examiner of the Metropolitan Board of Works. The health of Mr. Keates has been such as to cause considerable solicitude on the part of his friends for some few months past.

Into the full particulars of the public life of Mr. Keates we have not opportunity at present to enter, seeing that such a task would carry us over a vast number of subjects connected with the local history of the Metropolis for a long series of years. On the gas question Mr. Keates was an acknowledged authority of high repute, and this led doubtless to his appointment many years ago as the Superintending Gas Examiner to the Metropolitan Board. But his acquaintance with a variety of subjects made him master of the situation at several crises; and as the Board availed themselves of his services on one subject after another, they found that they possessed in their new officer an adviser of no ordinary rank. The post of Consulting Chemist naturally fell to his lot, and for this there was a broad field of labor in connection with Metropolitan questions. The law regulating the storage and sale of petroleum is one which has called for amendment more than once, and on this subject Mr. Keates was consulted many years ago by the Home Office. On all matters connected with the gas and water supply Mr. Keates was ever prepared to act with much judgement and precision, avoiding extreme views, and advocating methods which secured the public welfare without any reckless onslaught on interests which Parliament had created for the general good. The electric light found the fairest possible treatment at the hands of Mr. Keates; and at his instance many interesting experiments were conducted in connection with the introduction of the Jablochkoff system on the Victoria Embankment. In superintending these proceedings the name of Mr. Keates was associated with that of Sir Joseph Bazalgette; but the latter will doubtless be quite prepared to acknowledge the extent to which Mr. Keates deserves the credit of having evolved valuable data from the Jablochkoff experiments. The alleged pollution of the Thames by the Metropolitan drainage outfalls was a matter in which Mr. Keates took a lively personal interest, and on which he rendered very essential aid to the Board of Works. At the time when personal indisposition began to weaken his energies, Mr. Keates was carrying on an extensive series of analyses respecting the water of the Thames, in anticipation of another Government inquiry on this vexed question.

In his earlier days Mr. Keates was intimately acquainted with Daguerre and others, then engaged in developing the art of photography. His early training appeared to mark him out for the profession of surgery, but events gave a different direction to his energies. As a scientific chemist he was repeatedly consulted by manufacturing firms, and in some cases was permanently retained. An arrangemeht of this nature connected Mr. Keates

with the paper mills of Mr. Joynson, at St. Mary Cray, and the oil works of Messrs. Price & Co., the well known firm having offices at Blackfriars. An active and useful life, of which these remarks offer but a very imperfect glimpse, is now closed, and the loss will be felt by a large number of personal friends, besides creating a void not easily filled up in the world of industrial and practical science.—*Journal of Gas Lighting.*

[From Report of Proceedings of Society of Engineers, London.]

## Mr. Spice's Remarks on Messrs. Bigg's and Beaumont's Paper on Electric Light Engineering.

Mr. R. P. Spice said that the more he studied the electric light the farther he was from arriving at a favorable conclusion as to the practical or economic value of it. He, however, admired the incandescent burner, and he believed that there was a great future in store for electrical men. The more the electric light was used, or, in other words, the more the public becomes familiar with lights of great intensity the less they would be disposed to put up with poor gas lighting as contra-distinguished from good gas lighting, such as that afforded by Sugg and by Bray; but he believed that gas light would be found far more economical than the electric light.

He had that day met a shareholder in the Midland Railway Company who told him as a fact that a certain amount of lighting which cost the company £170 to perform satisfactorily by gas, cost them at the same station £1,700 to do with the electric light. This was a startling fact, and the difference was, in that instance, beyond what he was prepared to expect; but he was on the very opposite line taken by Mr. Pendred, who talked about electric lighting costing only one-sixth of gas. He thought that if Mr. Pendred would go into the depths of the subject, he would arrive at the conclusion that, light for light, the electric arc light would cost three times as much as gas, reckoning gas at three shillings a thousand feet. When he was recently in America he got one of the best electricians in New York to work out for him the relative cost of the arc light and the incandescent light, and the result of the calculation was that the incandescent light would cost seven times as much as the arc light.

As to the startling difference between his friend Pendred and himself, he was prepared to test it practically; and if Mr. Pendred would choose a town of any size, and light it with electricity, he (Mr. Spice) would choose a town of the same size, and light it with gas, and he would undertake that the lighting by gas would bear a profit, while Mr. Pendred's undertaking would be saddled with a loss. That was a fair challenge, and the sooner such a comparison was made, the sooner would they clear up the mystery of the relative cost of the two methods of illumination.

There was another view of the question. He did not like the light as it was applied on the Thames Embankment. That was the Jablochkoff arc light, which he considered to be the least satisfactory of all, although, according to his own view, the arc light was the only one which was fit for open spaces. He had thought that it would possibly become a permanent institution in railway stations in cities about the country; but he now had doubts about that result when he considered the risk which was caused by the depth of shadow, and its proverbial uncertainty.

The depth of shadow would in all cases be in proportion to the intensity of the light. Unless the lights were multiplied, the shadows would be inconveniently deep. A recent evening newspaper gave an account of the drowning of a boy in the river near Westminster Bridge through the running down of a small boat by a steamer. The captain of the steamer stated the electric light was the cause of the accident, as it threw such strong lights and shadows across the river. The look-out man at the bows said that he did not see the boat until it came suddenly out of the shadow into the glare. That was one of the incoveniences of an intensely strong light.

[Mr. Spice made the following further remarks on this same subject at an adjourned discussion, held April 3d, 1882.]

Mr. Spice said that he did not know that he could follow in the lines now laid down by one of the authors of the paper, so far as concerned the inducements which might be held out to young men who were seeking to enter the profession of a civil engineer. But electricity had, within a few years, obtained a foremost place in the walks of science, and engineers would be very stupid if they did not regard the lessons which were to be learned on all sides in connection with what might be fairly called electrical science, or the science of electric light and power.

For his own part, if he was anything in his own profession he was a practical man; and he could not help thinking that electricians had only themselves to thank for a little feeling of antagonism on the part of gas engineers towards electricians and their progress. Electricians headed by Mr. Edison, undoubtedly a very great genius, made a mistake when they talked about annihilating gas and gas interests.

A gas engineer who knows his business must know that the more a demand for good lighting prevailed the more work would he have to do in the present and in the future; and therefore the statements made by electricians did not matter two straws to the gas engineer. But those statements did matter very much to those unfortunate people who were shareholders in gas companies, and the vain boasting of electricians had been a cruel hardship inflicted on gas proprietors, for it had for some time depreciated the market value of their property. He had looked to ascertain whether he could find anything of recent date which would bear on the rather exaggerated statements which had been made with regard to the comparative cost of gas lighting and lighting by electricity, and he had met with the following estimate for lighting the town of High Wycombe with the electric light.

HIGH WYCOMBE ELECTRIC LIGHTING.

Estimate furnished March 16th, 1882, by the Hammond Electric Light and Power Company, for electric light plant for 25 arc lights on the Brush system, said to be equal to 2,000 candle power nominal, £2,282 10s., exclusive of wire and shed for engine, boiler and machinery.

*Details of Estimate.*

| | £. | s. | d. |
|---|---|---|---|
| Two 16-light Dynamo Electric machines, at £400 each | 800 | 0 | 0 |
| 25 double lamps, at £16 each | 400 | 0 | 0 |
| 25 standards, fittings, globes, etc., at £12 10s. each | 312 | 10 | 0 |
| Two speed indicators for dynamo machines at £10 each | 20 | 0 | 0 |
| Two automatic regulators at £26 each, packing, fixing, erecting, starting, running wires overhead, instructions to workmen in use of machine and lamps | 150 | 0 | 0 |
| Engine power, engine and boiler (special make) for electric light, foundations for dynamo, and engine belting etc | 600 | 0 | 0 |

*Extras.*

| | | | |
|---|---|---|---|
| Wire, according to length required (insulated) at 1s. per yard; non-insulated, 3d. per yard; insulators, 3s. 6d. each; jibs, brackets, etc., and shed for machinery, not filled in, but say | 600 | 0 | 0 |
| | £2,882 | 10 | 0 |

*Annual Cost of Working 3,600 Hours per Annum.*

| | | | |
|---|---|---|---|
| Labor: one electrician in charge, £130; one engine driver, £100; 1 trimmer, £80 | 310 | 0 | 0 |
| Coal: say 121 tons at 20s. per ton=3 lbs. per n.p. per hour, and 1 h.p. per light | 121 | 0 | 0 |
| Carbons, ¾d. per hour per light | 281 | 5 | 0 |
| Depreciation and redemption two per cent. on dynamos (£800) £16; 5 per cent. on lamps, etc. (£732 10s.) £36 12s. 6d. | 52 | 12 | 6 |
| 10 per cent. on engines, wire insulators, fixing, etc., not filled in, but omitted | 120 | 0 | 0 |
| Sundries | 50 | 0 | 0 |
| Annual charge | £934 | 17 | 6 |

NOTE.

| | | | |
|---|---|---|---|
| 147 gas lamps now in use, lighted for £3 8s. each, costing the town £499 16s. per annum | 499 | 16 | 0 |
| | £435 | 1 | 6 |
| Depreciation of plant not provided for in the company's estimate, the Corporation estimate at £150 per annum | 150 | 0 | 0 |
| Annual extra cost of electric lighting over the cost of gas | £585 | 1 | 6 |

With regard to the candle power of the electric light, Mr. Pendred had, in very proper terms, stated that he abstained from committing himself to the actual candle power of the light to which he was referring. He (Mr. Spice) had met with the idea that the figures given with regard to the candle power of the lights were derived from the French method of estimating the power. It was said that the French method was to measure the direct rays in one direction, and then to multiply the measurement by four on account of the rays being distributed *all round*. The newspaper account, from which he had copied the High Wycombe estimate, spoke of only one boiler; but he held that in such a case it would be very unwise to depend upon one boiler or one engine.

He was once on board a steamer in the middle of the North Sea when the engine failed for want of boiler power. The steamer had only one boiler, which was for some hours rendered useless by the giving way of a rivet, and he mentally resolved that he would never go to sea again in a vessel which had only one boiler.

With regard to electric lighting everything ought to be in duplicate as far as the machinery was concerned. One estimate on the subject of the

cost of the electric light, sent out by a company which was desirous of obtaining a contract, was, perhaps, as a criterion, as good as fifty. He would leave the matter there with the plain statement of a plain fact as regards the estimate for lighting High Wycombe by means of electricity.

### Sulphate of Ammonia Manufacture on a Small Scale.

By a process invented by M. Hennebutte, liquor containing ammonia, however weak and small in quantity, is said to be rendered profitable as a source of ammonia sulphate. In this process common alum cake is used, which is an impure sulphate of alumina, obtained by treating clay with oil of vitriol. This substance is more conveniently handled than the acid itself. The apparatus required consists only of a wooden cask, which is to be filled with the weak ammoniacal liquor from a small gas works, or with liquid manure. A definite quantity of the re-agent is added, and the mixture is allowed to stand for half a day, when the ammonia will be found completely fixed. The sesquicarbonate and hydrosulphite of ammonia contained in liquid manures, when they come into contact with sulphate of alumina, are brought to the state of soluble sulphate of ammonia, while the hydrate of alumina precipitates and carries down with it all the impurities of the liquid. During the operation carbonic acid and sulphuretted hydrogen are, of course, disengaged in considerable quantity, mixed with other gases, which render it advisable that the vessel should be well sealed, and provided with an oxide of iron purifying shelf, whenever the process is carried on near inhabited buildings.

After standing for some hours the supernatant fluid containing the ammonia may be decanted without disturbing the precipitate, as the density of the latter continually increases. When it is intended to prepare hydrochlorate of ammonia, there is used as a re-agent a double chloride of calcium and iron. This salt is very simply obtained by treating powdered iron in a flask containing hydrochloric acid. At the end of 24 hours the iron will be dissolved, and the liquid will be a very acid chloride of iron. This liquid is then poured into a flask containing pieces of lime; and 24 hours later the double chloride formed will be ready to mix with the liquid manure, or gas liquor. The sesquicarbonate of ammonia is decomposed, soluble hydrochlorate of ammonia is formed, and carbonate of lime precipitates. The hydrosulphate of ammonia is converted into sulphide of iron, which likewise precipitates, leaving the hydrochlorate of ammonia in solution. After a few hours' rest this may also be easily decanted.

Either of these solutions of ammonia salts may be concentrated by evaporation in trays heated by the spent gases from a furnace.—*Journal of Gas Lighting.*

### Portable Gas Apparatus.

The following description of a small portable gas apparatus, designed by Mr. A. J. Clavel, of Molenbeck, St. Jean, Belgium, and which would appear to be adapted for the manufacture of gas to be used as a source of heat, power, or light for small industries, is taken from the *Iron Age*:

The apparatus consists of three principal parts, the motive power mechanism, the air apparatus, and the carburetter.

The power is derived from a clockwork, motion being imparted to the latter by an ordinary spring, or by a set of counterweights where the form of the apparatus admits of their use. Two counterweights are usually employed, running upon an endless cord, and being wound up by means of a key or similar device. The counterweights move in grooves formed by the outer wall of the case or shell, and a light partition in the interior. A fly-wheel serves to regulate or stop the clockwork mechanism, and is in its turn governed by a button fixed at the extremity of spring side, which may be pressed against the fly-wheel to cause its instantaneous stoppage. An exterior wheel arrangement, with fixed needle, movable disc and locking button, permits of the duration of the running of the apparatus to be fixed, this being an important point.

The counterweights being wound up, and the wheel arrangement regulated, the apparatus will extinguish the burners and cease to manufacture gas at the hour fixed The counterweights are, moreover, so constructed that they can be regulated according to the number of burners used. The air apparatus consists of two pump cylinders with the necessary valves, and provided with pistons and piston-rods acted upon by the clockwork mechanism.

The air drawn in by these cylinders is forced through a tube into the air tank provided with a pressure regulator. The air passes from the air-tank into the carburetter, which is an air-tight metallic vessel provided with an opening and a screw top by which fresh hydrocarbon can be introduced, and any excess which may occasionally be found may be drawn off by a tap fixed in the lower portion of the carburetter, the latter being divided into several compartments by means of inclined partitions filled with substances such as oakum, vegetable or animal fiber, hay, asbestos, or equally suitable substances, which absorb the liquid hydrocarbon, and allow the air circulating through the compartments to take up the combustible portion of the liquid. The air thus charged is delivered through a pipe direct to the burners without an intermediate gas holder, and the carburetter can be readily withdrawn from the apparatus for the purpose of replenishing.

### The Siemens Gas Producer at Dalmarnock.

The Siemens system of carbonizing, as employed at the Dalmarnock Gas Works, Glasgow, Scotland, is giving an excellent example of what progressive and intelligent working may accomplish. The London *Journal* gives the following particulars concerning this system:

"Our Glasgow correspondent, writing in reference to a visit he recently paid to the Dalmarnock Gas Works, Glasgow, as stated in his "Notes" in the *Journal* of recent date, for the purpose of inspecting the system of carbonizing by the new form of the Siemens gas producer, which has been brought into operation there, states that the plant as at present working consists of four producers, in two pairs, each of them providing the carbonizing power for a bench of eight retorts 9 feet in length. The producers are 6ft. 3 in. in height, and are lined internally with a nine inch layer of fire bricks. They are built in such a way that the stoking opening is on a level with the retort house floor, while access is obtained to the lower working part by means of an underground tunnel, which is well lighted and agreeably cool. The fuel used is the "spent" coke or char from the retorts, which is thrown into the gas producers while it is quite fresh or in the state of "live" coal, but deprived of its hydrocarbons. It is worthy of note, however, that by the new arrangement of carbonizing, the quantity of coke necessary to do a given amount of work is reduced by one-third, and the heat-regenerative system which is at work enables the retorts to carbonize about 40 per cent. more coal than the retorts fired in the ordinary way can do; and they may yet do more work, there being quite sufficient heat. At present the system of 3-hour charges is maintained; but the heat obtained is amply sufficient to get off in 2½ hours all the gas that it may be prudent to extract from the coal: and it is not unlikely that 2½-hour charges may ultimately be resolved upon. Although the retorts have been in operation for about six months, the whole of the brickwork is as clean as it was at first, and everything gives indication of the retorts having a greater durability than is experienced in ordinary practice.

### Gas Stove for Heating Soldering Irons.

The Lancashire Gas Meter Company (Limited) have brought forth an excellent stove for heating soldering irons by gas. The stove is intended to be placed on the bench between two workmen, and to heat two irons at the same time. Under the bench an air-pipe is conveyed to a blast from the fan or bellows; the air and gas are forced by the pressure of the blast into a mixer, which thoroughly incorporates them and delivers the mixture at the burner, producing a perfectly clear and brilliant light. Where no blast is available, a bell-mouth inlet is substituted for the air-blast. The heat can be regulated, as it is perfectly under control, and the irons are kept thoroughly clean. It will remove all risks of fire from loose cinders dropping about.

The Same Company also exhibited at the recent Smoke Abatement Exhibition their "Falcon" mercurial gas governor, for regulating the supply of gas to burners and cooking stoves. It is fixed on the main service pipe, the gas passing into the low pressure chamber through the regulating valve, the extent of the opening of which is governed entirely by the pressure of the gas acting upon the bell-holder. Gas is generally supplied at pressures varying from 1½ to 3 inches (of water column), while experience shows it to be more advantageous to burn it through large sized jets at a low uniform pressure of from 0.5 to 0.7 inch.—*Ironmonger.*

### System of Burning Gas and Coke.

The system of burning gas and coke invented by Dr. Siemens, F.R.S., has been adopted for open firegates by several exhibitors at the Smoke Abatement Exhibition, but only Messrs. Brown, of Picadilly, have applied the arrangement to an ordinary kitchen range. Dr. Siemens has therefore had made by the Falkirk Iron Company two cooking ranges—one an ordinary close fire kitchener, with oven and roaster and back boiler fittted up on his system, the only alteration required being the necessary iron bottom and gas burner; the other is a cottager's range, suitable for a small family. These two ranges show how easily the plan can be adapted to existing kitcheners, and the results are far better than were expected. A dull red fire has never been considered so good as a quick-burning long flame for passing round the flues; but in this case it is found to be thoroughly efficient, as a greater heat can be obtained than with existing coal fires. The question of cost will be one for management.—*Ironmonger,*

THE AMERICAN
GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
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FRIDAY, JUNE 16, 1882.

## Patents.

256,934. Automatic gas apparatus.—B. C. Vanduzen.
257,054. Chandeliers.—Stephen S. Newton.
257,070. Electrical gas lighting apparatus.—T. H. Rhodes.
257,100. Process of and apparatus for manufacturing gas.—T. G. Springer.
257,188. Electrical gas lighting apparatus.—T. H. Rhodes.
257,195. Electric gas lighter.—W. H. H. Whiting.
257,447. Process of manufacturing illuminating Gas.—O. Lugo.
257,494. Gas exhaust regulator.—R. K. Huntoon.
257,545. Process of manufacturing water gas.—Wm. H. Bradley.
257,547. Extension chandelier.—J. E. Brown.
257,550. Process of and apparatus for generating gases for motive power, heating, and illuminating purposes.—Wm. F. Brown.
257,848. Air gas machine.—J. P. Clifford.
258,068. Chandelier.—Wm. A. Hull.
258,104. Chandelier.—S. S. Newton.
258,105. " "
258,106. " "
258,135. Drop light pipe for chandeliers.—G. P. Schmucker.
258,136. Electric gas lighter.—W. D. Schooley.
258,774. Apparatus for the manufacture of combustible gas.—E. Langen.
258,884. Gas motor engine.—H. H. Burritt.
259,267. Electric device for turning on, lighting, and extinguishing gas jets.—A. L. Bogart.

REISSUES.

10,101. Apparatus for generating gas for headlights.—H. S. Maxim.
10,116. Gas regulator.—N. Sleeman.

MUCILAGE FOR LABELS.—Mix dextrine with water and add a drop or two of glycerine.

## Gas Stocks.

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JUNE 16, 1882.

☞ All communciations will receive particular attention
☞ The following quotations are based on the par value of $100 per share.

| | Capital. | Par. | Bid. | Asked |
|---|---|---|---|---|
| *Gas Co.'s of N. Y. City.* | | | | |
| Central | $466,000 | 50 | 70 | 75 |
| Harlem | 1,800,000 | 50 | 94 | 96 |
| " Bonds | 170,000 | | | 103 |
| Manhattan | 4,000,000 | 50 | 210 | 215x |
| Metropolitan | 2,500,000 | 100 | 165 | 167 |
| " Bonds | 658,000 | .. | 107 | 110 |
| Mutual | 5,000,000 | 100 | 92 | 95 |
| " Bonds, go'd. | 900,000 | 1000 | 202 | 205x |
| Municipal | 1,500,000 | 100 | 175 | 180x |
| " Bonds | 750,000 | | 106 | 110 |
| New York | 4,000,000 | 100 | 115 | 118 |
| Northern | 270,000 | 50 | — | 100 |
| *Gas Co's of Brooklyn.* | | | | |
| Brooklyn | 2,000,000 | 25 | 100 | 103 |
| Citizens | 1,200,000 | 20 | 67 | 70 |
| " S. F. Bonds. | 320,000 | 1000 | 105 | 109 |
| Fulton Municipal | 3,600,000 | 100 | 85 | 88 |
| Peoples | 1,000,000 | 10 | 45 | — |
| " Bonds | 290,000 | . | 104 | 107 |
| " " | 250,000 | ... | 90 | 92 |
| Metropolitan | 1,000,000 | 100 | 50 | 55 |
| Nassau | 1,000,000 | 25 | 50 | 55 |
| " Ctfs. | 700,000 | 1000 | 93 | 96 |
| Williamsburgh | 1,000,000 | 50 | 50 | 60 |
| " Bonds | 1,000,000 | ... | 100 | 101 |
| Richmond Co., S. I. | 300,000 | 50 | 70 | 75 |
| " Bonds | 40,000 | — | — | — |
| *Out of Town Gas Companies.* | | | | |
| Buffalo Mutual, N.Y | 750,000 | 100 | — | 75 |
| " Bonds | 200,000 | 1000 | 95 | 100 |
| Citizens, Newark | 918,000 | 50 | — | — |
| " " Bds. | 124,000 | — | 105 | 10 |
| Chicago Gas Co., Ills | | | 125 | — |
| Cincinnati G. & C. Co. | | | 178 | 180 |
| Consolidated, Balt. | | | 38 | 39 |
| Bonds | | | 107 | — |
| East Boston, Mass | 220,000 | 25 | 122 | 128 |
| Hannibal, Mo | 100,000 | 100 | 95 | 100 |
| Hartford, Conn | 700,000 | 25 | 140 | 144 |
| Halifax N. S | 400,000 | 40 | 148 | 150 |
| Hamilton, Ontario | 150,000 | 40 | 117½ | |
| Jersey City | 750,000 | 20 | 155 | 160 |
| Jacksonville, Ill | 120,000 | 50 | 100 | ... |
| Lewistown Maine | 400,000 | 100 | — | 100 |
| Laclede St Louis Mo | 1,200,000 | 100 | 112 | 117 |
| Montreal, Canada | 2,000,000 | 100 | 173 | 174 |
| New Haven, Conn | | 25 | 132 | — |
| Oakland, Cal | | | 32 | 33 |
| Peoples, Jersey City | | ... | 75 | 80 |
| " " Bds. | | | ... | ... |
| Pittsfield, Mass | | | 120 | 130 |
| Rochester, N. Y | | 50 | 70 | 80 |
| Wilmington, Del | | 50 | 174 | ... |

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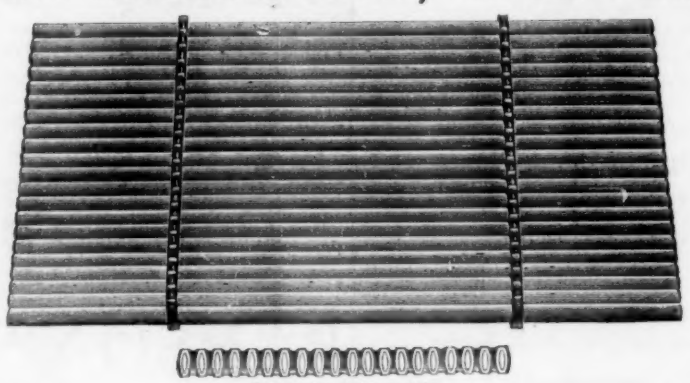

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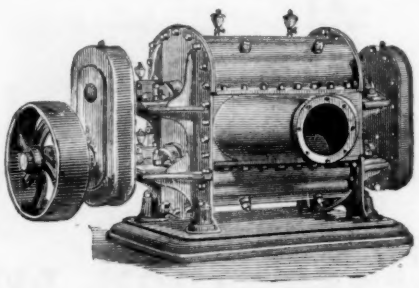

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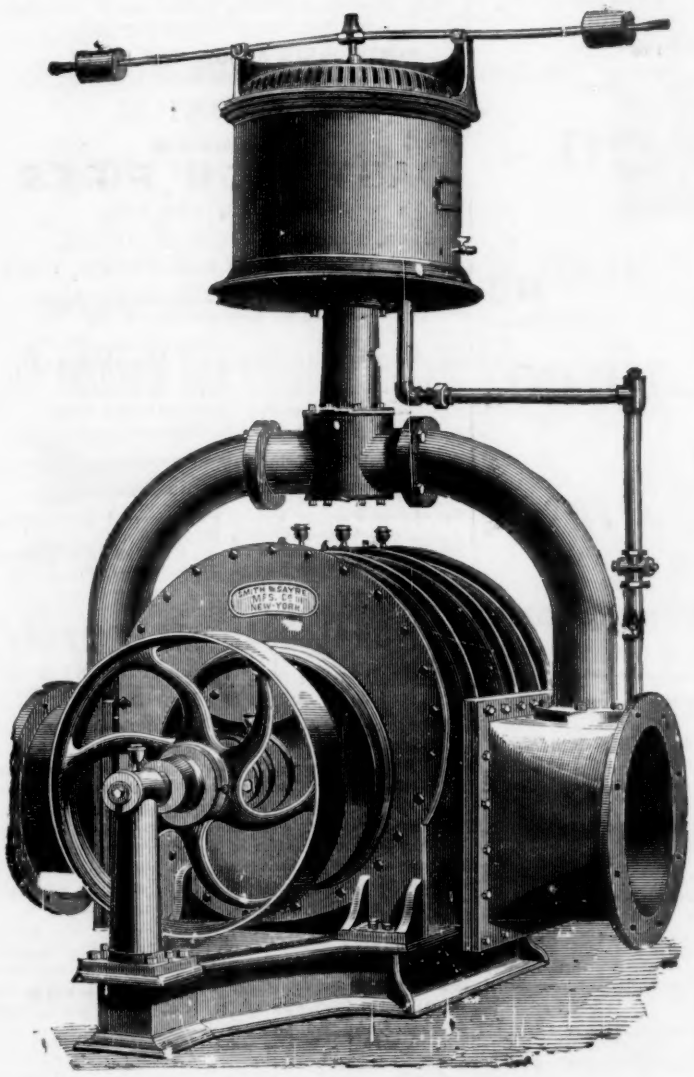


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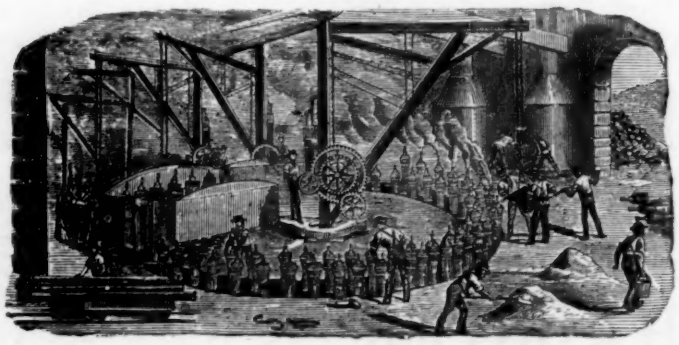

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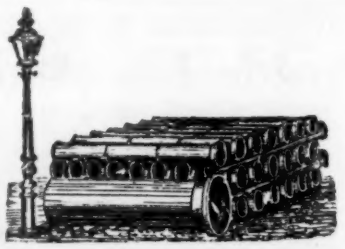

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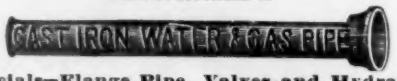


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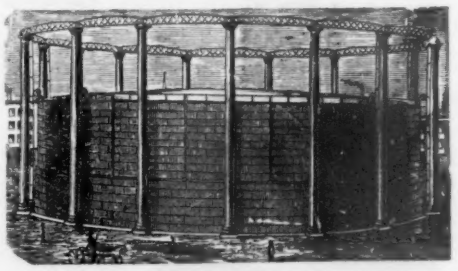

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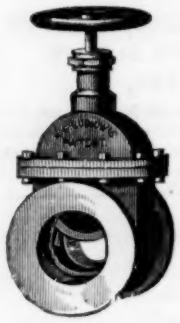

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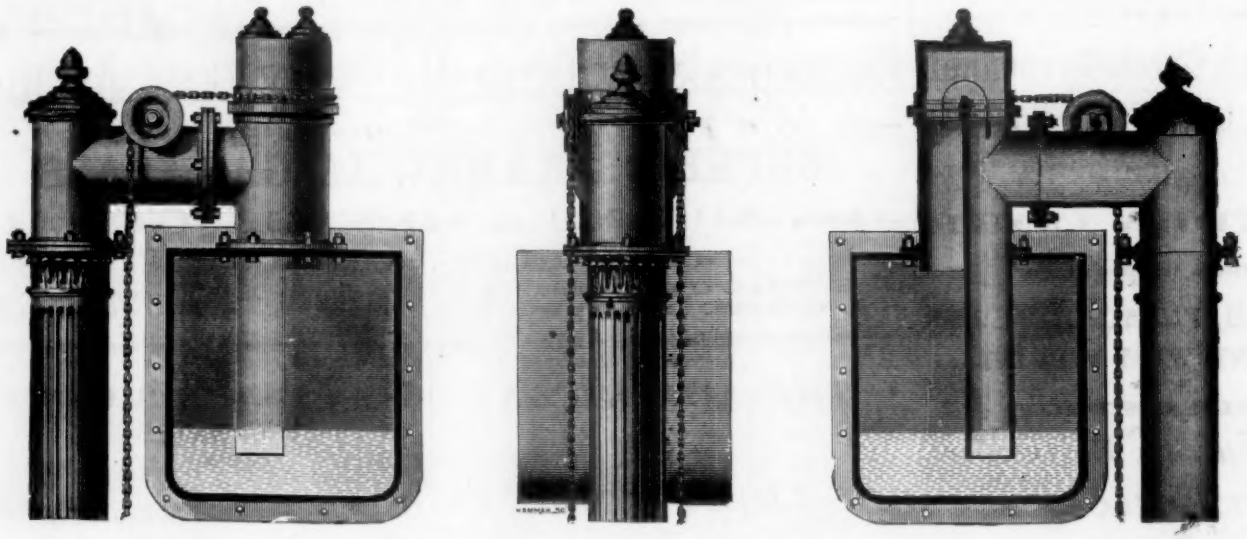

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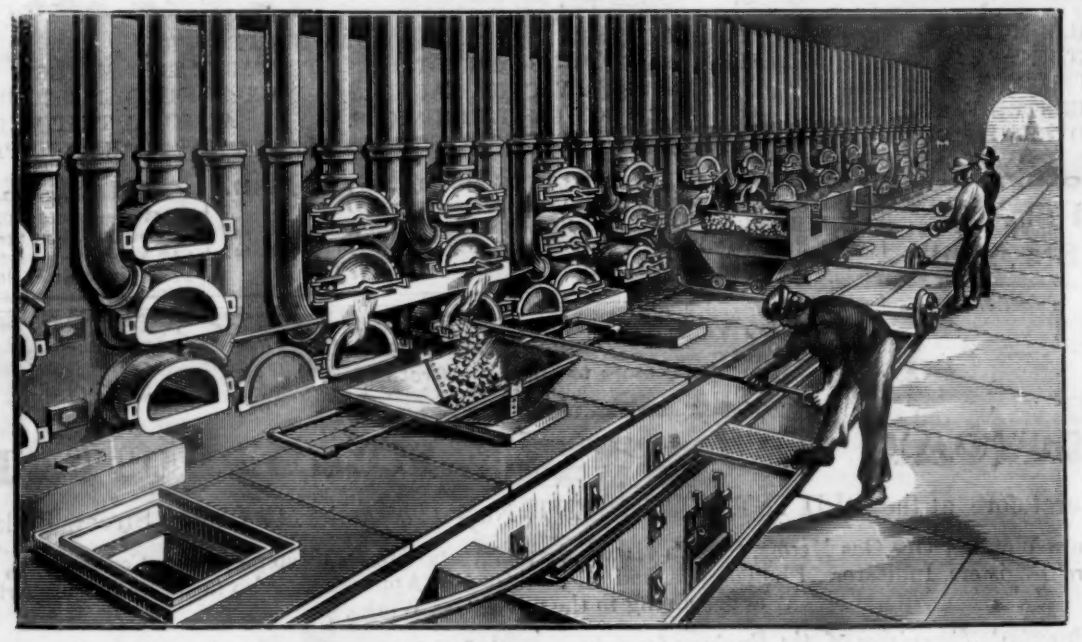

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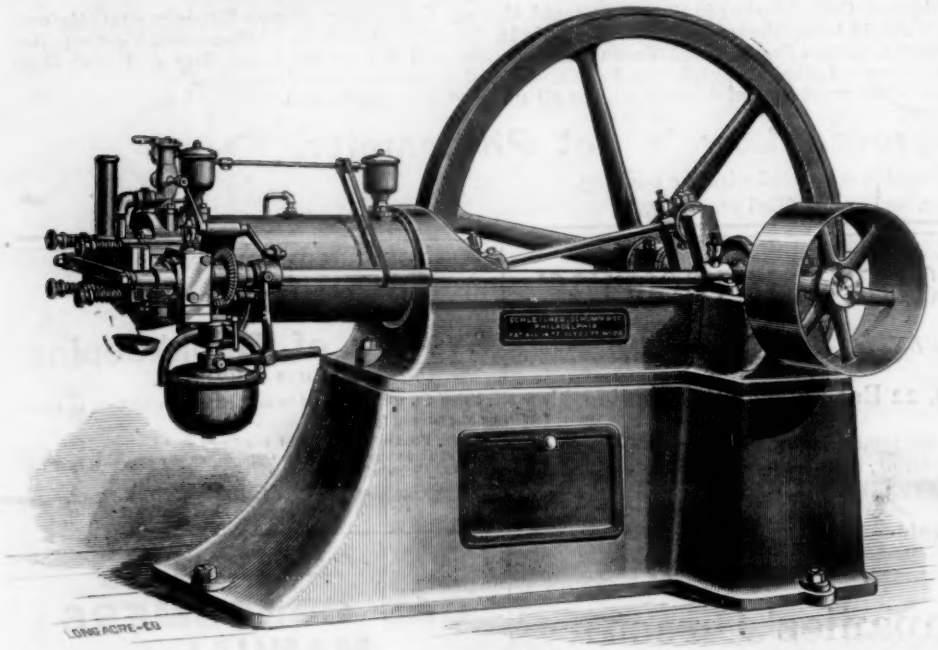

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